Remarks
ON
EIGHTEEN CASES OF SPINAL ANALGESIA BY THE STOVAINE-STRYCHNINE METHOD OF JONNESCO,
INCLUDING SIX CASES OF HIGH DORSAL PUNCTURE.

BY

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It will be within the recollection of the members of the medical profession that in the autumn of last year Professor Thomas Jonnesco of Bucharest demonstrated before the Surgical Section of the Royal Society of Medicine, and also in the operating theatre of the Seamen's Hospital, a method of spinal analgesia introduced by him with the object of rendering possible operations on the head, neck, and upper extremity. As I was mainly responsible for these demonstrations, and have since then submitted Jonnesco's method to the test of practical application in my wards, I have ventured in this communication to place the results obtained before my professional *confrères*, as much to satisfy many inquirers as to issue a warning to those who may wish, like myself, to see the practice of spinal analgesia extended to the upper regions of the body. Jonnesco's method is based on the supposition that the addition of neutral strychnine sulphate to the stovaine employed is capable of overcoming the danger of respiratory paralysis when the injection is made between the spines of the first and second dorsal vertebrae, or when, the solution having been injected at a lower level, it has been purposely allowed to gravitate to the upper regions of the cord, the patient being in the Trendelenburg position.

With regard to the results obtained by Professors Jonnesco, Janio, and Nasta,[1] it must be admitted that, as reported, they would suggest a very high measure of success and safety, and, compared with my cases here reported, show a marked contrast, since it is claimed that in no case was any ill effect noted. Whether this is due to exceptional experience, or to some peculiarity in the class of patient submitted to operation in our respective countries, I am unable to say; it is, however, reasonable to suppose that the method, when first attempted by Professor Jonnesco, was as new to him as it was to me when I followed his example. Whatever the results obtained in Bucharest may have been, it will be remembered by those who were present in the operating theatre of the Seamen's Hospital, that of the three cases injected by Professor Jonnesco by his own method and using his own drugs and instruments, only one—a case of tuberculous cervical glands—was completely successful. In the second—a laparotomy—the injection was made in the dorsi-lumbar interspace, and the patient, although analgesic, so far as his skin and muscles were concerned, to a point considerably above the level of his fifth cervical vertebra, complained of dragging sensations when his intestines were manipulated, and had to be submitted to a general anaesthetic. The third case, that of a boy of 12, was given 2 cg. of stovaine and ½ mg. of strychnine, with a view to exploration of his mastoid antrum; complaining of pain on the application of the gouge, he was given a second dose of the same amount; he still complained of pain, and was then given chloroform. It is, however, only fair to say that this boy assured me on the following day that, being afraid, he had lied, and that he had experienced no pain whatever, and that it was the grating of the metal on the bone which frightened him. Further, the fact remains that all three of these patients were analgesic to above their phrenic origins, two of them actually to the vertex, and yet there was neither respiratory paralysis nor any ill effect afterwards.

The reason of the early publication of so few cases from my own wards is, I regret to say, that I have not been convinced of the safety of Jonnesco's method; nor, from what I have seen of it, do I feel justified in employing it further for the present. I have set forth the report of my cases without any attempt either to magnify the importance of those which were successful, or to mitigate the adverse facts in those in which the method failed. The statements with regard to each are strictly accurate in every detail.

Professor Jonnesco claims as his method both high and low punctures whenever strychnine is combined with stovaine. I have therefore included all such cases in my report, although some of the latter might possibly have been done equally well without strychnine, for I have frequently obtained analgesia to the clavicles by stovaine alone without any sign of respiratory paralysis. The chief interest, however, lies in the six cases of high dorsal puncture (Nos. 7, 8, 10, 12, 14, 15), and in the two cases (Nos. 1 and 2) in which, the puncture being made at the level of the eighth dorsal spine, the analgesia rose above the phrenic origins, and in that of No. 6, in which artificial respiration was successfully employed for a period of sixty-five minutes.

It is a matter of great regret to me personally, as I am sure it will be to Professor Jonnesco, whose great courtesy I wish to acknowledge most cordially here, that these cases have not in my hands borne out his contention that the addition of strychnine is capable of preventing respiratory paralysis. The fact is, however, obvious, that although in some cases respiratory paralysis does occur, there are others in which there is no sign of it. In the state of our knowledge of the subject, and with the drugs at present at our command, the method appears to me to be fraught with considerable danger, apart from which the condition of a patient suffering from respiratory paralysis and yet perfectly conscious, even if artificial respiration can be successfully applied, is one of great mental anguish and bodily discomfort, and extremely harassing to witness.

CASE I.

A. R., aged 27, a man of spare physique, suffering from a left-sided empyema. He had been ill for some weeks, and at the time of operation his appearance was hectic, his left chest quite motionless, and his intercostal spaces obliterated. Pulse 110. Temperature 102.5°.

Not having at hand the dry stovaine employed by Professor Jonnesco,* I employed 5 cg.† of Barker's stovaine-glucose solution, to which was added 1 mg. of neutral strychnine sulphate. This was injected between the seventh and eighth dorsal spines without difficulty, the patient being in the left lateral position. At the end of one minute he was turned over on to his back; the Trendelenburg position was not used, but no attempt was made to keep the patient's head elevated as in the ordinary form of spinal analgesia. The analgesia rose steadily to the level of the eyes in three minutes, and descended to about the groins. Respiration continued unaltered in rhythm or amplitude, and short of slight nausea for a moment or two, the patient experienced no discomfort. A portion of the eighth rib was resected and the empyema evacuated. The patient felt nothing of the operation, and his convalescence was uneventful. During the analgesia, which lasted for 40 minutes, any operation might have been easily accomplished between the chin and the umbilicus, the analgesia being deep over this area. There was neither sickness nor headache. Pyrexia could not be estimated, as the case was already septic.

CASE II.

J. C., aged 35, admitted to hospital for a small epigastric hernia of some months' duration. A man of good physique; 5 cg. stovaine and 1 mg. strychnine were injected as in the above case, but in the sitting position. Patient was at once placed upon his back, the head not being at all raised. Analgesia rose gradually to the level of the eyebrows without any interference with the intercostals or the diaphragm. No inconvenience on the table other than slight nausea. The analgesia extended to the middle of the thighs, and was quite satisfactory in the epigastric region. It lasted about 50 minutes, and was followed by no ill effects of any kind. Pyrexia.

CASE III.

W. H., aged 43, admitted for complete forward dislocation of the tibia on the femur, with rupture of all the deep structures behind the knee-joint, resulting in gangrene on the third day. Injection performed in the left lateral position; 6 cg. stovaine + 1 mg. strychnine given through the dorsi-lumbar interspace. Strychnine added in this case, as, owing to the patient's condition, it was thought that the Trendelenburg position might be required during operation. Analgesia rose to the level of the nipples, and amputation was performed at the middle of the thigh. The analgesia was perfect. There was neither vomiting nor faintness, nor was there any shock following the operation. Analgesia lasted about forty minutes; there was no subsequent pyrexia.

* Cases I and II were both done prior to the visit of Professor Jonnesco to London.

† This of course refers to the amount of the drug in the solution.

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CASE IV.

H. B., aged 14, admitted for undescended testis. Injection consisted of 4.5 cg. stovaine-glucose + ½ mg. strychnine. Analgesia rose to the level of the eighth dorsal vertebra, and was perfect. Patient vomited once on the table. The testis was transplanted to the scrotum without difficulty. Analgesia lasted thirty-five minutes, and was followed by no after-effects other than pyrexia, which lasted four days, and ranged from 99° to 99.5°.

CASE V.

H. L., aged 26. Admitted for perforated duodenal ulcer. This was the first case submitted by me to injection *after* the visit of Professor Jonnesco to London, and by his advice I did not employ mid-dorsal puncture, but made the injection in the dorsi-lumbar interspace, using stovaine (dry) 10 cg. + 1 mg. strychnine, and placing the patient at once in the deep Trendelenburg position. Analgesia rose slowly to the level of the fifth dorsal area, and remained there; accordingly, at the end of fourteen minutes I again injected 3 cg. stovaine + ½ mg. strychnine, and, as before, used the Trendelenburg position. This was followed by a rise of analgesia to the level of the second dorsal area, after which the abdomen was opened. Much turbid fluid appeared along the ascending colon and among the intestinal coils, and with great difficulty, owing to the narrowness of the costal angle and the depth of the thorax, a perforation was found in the first part of the duodenum. The perforation had become sealed off by recent lymph, and the patient's condition precluded a gastro-enterostomy. Accordingly the abdomen was cleansed by sponging, and drains were placed in the right loin and pelvis. Only once during the operation did the patient complain of dragging and nausea when the stomach was pulled upon. No pain was felt till the last skin sutures were being inserted, the analgesia having lasted 70 minutes. Recovery was rapid; there were no after-effects. In spite of the large dose (13 cg. in all) the intercostal muscles were quite unaffected and strong expiratory efforts could be made. There was complete absence of any increase of shock, in spite of prolonged manipulation of the bowels, and the patient's condition was distinctly better after than before operation.

CASE VI.

N. B., aged 32. This patient, a nurse, was seen by me for acute haematemesis occurring on three consecutive days. She was subject to gastric ulcer, and had been ill on previous occasions. When I first saw her she was blanched, bringing up repeatedly small quantities of blood; her pulse was rather feeble and about 125, and her respirations sighing and about 14 to the minute. She was obviously very ill, and was said to have brought up in all about three pints of blood in the previous three days. Fearing that the vomiting after a general anaesthetic would result in a final haemorrhage, I resolved to attempt an operation by the method in question. I had no dry stovaine with me, nor had I strychnine. I therefore used 8 cg. stovaine-glucose solution + 1 mg. strychnine, the latter drug being made up from tabloids by the dispenser of the institution to which the patient belonged. I was very doubtful of the potency of this last drug, and expressed the opinion that it might fail, and that if it did respiratory paralysis might result. After consultation with her medical advisers, it was resolved to risk the injection—first, because the patient was still bleeding; secondly, because I am firmly convinced of the fact that stovaine does *not* paralyse the heart; and, thirdly, because this being so, I felt confident that if respiratory paralysis should occur, I could keep the patient alive by artificial respiration, she being of light build and a young woman. The injection was therefore given in the dorsi-lumbar interspace, and the head end of the table was slightly lowered. Two minutes later the patient, without uttering a sound, became completely unconscious and ceased to breathe either with her diaphragm or her intercostals. Her pulse at the moment of injection was 130. I now commenced artificial respiration, keeping nearly as possible to the normal rhythm, and at the end of ten minutes the pulse had fallen to 90, and was fuller and stronger than before; such colour as she had the patient kept very well. Her pupils at this time were slightly contracted. At the end of half an hour a pause was made to see if there was any movement of the diaphragm, but none was observed; the pulse was regular, and the aorta could be seen to be pulsating steadily and with fair strength. At the end of an hour the pupils began to dilate a little, and the eyelids, which had been half closed, gradually opened; there was also a suspicion of movement in the lips. A pause was again made, when it was found that the diaphragm was beginning to move; it, however, ceased again, and artificial respiration was again resorted to. Five minutes later the patient moved her head and began to breathe softly; presently she was conscious and asked where she was; she was at this time analgesic to the clavicles. Analgesia rapidly passed off, there was no further vomiting nor retching, and the patient gradually recovered after a prolonged convalescence. It should be stated that during the last fifteen minutes intravenous infusion of three pints of dextrose solution was performed by one of the resident medical officers through the long saphenous vein. Altogether, artificial respiration had been performed for a period of sixty-five minutes. No operation, of course, was possible.

I was at first inclined to attribute the failure of this case to the fact that the strychnine was in tabloid form, and had been kept for some months; from later experience, however, I am compelled to forego this hypothesis. Strychnine is one of the most constant of the alkaloids, rarely losing its potency or its cryataline form. Its is possible that in the weak condition of the patient the dose was unnecessarily high; at the same time Jonnesco advises a dose of 8 cg. to 10 cg. in cases of high abdominal section. I now believe that the trouble was due to the fact that the method itself is at fault, and that strychnine is not always to be depended on for the prevention of respiratory paralysis.

CASE VII.

K.W., aged 22, a Russian, was admitted for Jacksonian epilepsy of the left side, resulting from an old depressed fracture of the right fronto-parietal region, the injury having been received from the falling of a pulley-block nine months previously.

Injection consisted of 3 cg. stovaine (dry) + ½ mg. strychnine, and was given in the sitting position, the puncture being made between the first and second dorsal spines. The patient was hardly aware of the puncture, which was made without difficulty, and was at once placed upon his back, and the head and shoulders were lowered. In two minutes analgesia was complete to the crown of the head, and to a point just below the umbilicus, remaining quite perfect for over half an hour. A semilunar flap was raised from the scalp over the depression, and a disc of the cranial vault measuring 2.5 in. in diameter was removed by means of the trephine and gouge forceps. The patient chatted of various subjects throughout the operation, only remarking once of any pain, when the lowest of the sutures was inserted just above the eyebrow. There was no alteration whatever either in pulse or respiration, both of which were normally performed. After the operation he expressed his thanks, and walked back to his bed saying he felt none the worse for his experience. He slept well that night and the following night, having neither headache nor vomiting. The following day he was sleeping, and at tea-time could not be roused; the house-surgeon was sent for, and found him comatose, his breathing being stertorous and both his pupils dilated. He was at once seen by my colleague, Mr. Choyce, who realized from his appearance that it was too late to save him; death occurred shortly afterwards. A *post-mortem* examination revealed a large clot in the operation area due to secondary haemorrhage, presumably from a torn branch of the middle meningeal artery, although every care had been taken at the operation to provide against such an accident. The puncture in the dura mater was found between the spines mentioned, and the cord and its membranes and the base of the brain were found to be perfectly normal.

CASE VIII.

W. B., aged 35, was admitted for a fusiform enlargement of the lower half of the right humerus and crepitus about the condyles and in the elbow-joint. The diagnosis lay between sarcoma and gummatous osteitis. The skiagram did not help much, the showing in the upper half corresponding closely to the former, while that of the lower half closely resembled the latter disease. I therefore resolved to explore, and in the sitting position I injected the patient exactly as in the last case, placing him at once upon his back and lowering the head and shoulders. In five minutes analgesia was complete from the vertex to the costal margin. Respiration was in every respect perfect, and the analgesia, which lasted for forty-five minutes, would easily have permitted of the performance of an interscapulo-thoracic amputation, had the case proved to be malignant. It was, however gummatous, and the medulla being extensively disorganized as high as the upper third of the bone, it was entirely removed with a sharp spoon; the cavity was packed with gauze, and the wound, 7 in. in length, partly sutured. The whole operation was entirely painless, and the patient expressed himself as being "delighted with the method." His temperature was raised to 99° and 99.5° for the two subsequent days, remained normal for a day or so, and then again rose slightly as the result of the inevitable discharge. There was neither sickness nor headache.

CASE IX.

L. M., aged 36, a somewhat delicate woman although well developed, was seen by me in consultation for chronic ovaritis; she was in fact sent to me with a view to operation. Owing to her aversion to general anaesthesia, it was arranged to operate by spinal analgesia.

In the sitting position an injection was made of 8 cg. stovaine + 1 mg. strychnine (the same dose, it will be noted, as that which led to respiratory paralysis in Case VI) in the dorsi-lumbar interspace. Analgesia rose steadily to the nipples without producing faintness or other discomfort. The abdomen was opened, and the right ovary, being found to be small and cirrhotic, was removed in the usual manner. No nausea was felt on pulling on the uterus. The patient's pulse, which had been 130 before operation, steadied down during the operation, and was under 90 when it was finished. The analgesia lasted about an hour, and was quite perfect; it was followed by slight pyrexia for three days, otherwise there was nothing unusual to note.

CASE X.

J. B., aged 59, admitted for carcinoma of the tongue and secondary glands in the neck. It was not my intention to attempt removal of the tongue by this method, as I do not think the hardiest patient would care to face a severe tongue or jaw operation with his full consciousness retained. As this man expressed no objection to having the glands removed by its means, I submitted him to it. The injection was performed as in Cases VII and VIII. the patient being placed at once upon his back, with the head and shoulders lowered. Analgesia was less extensive, although the dose was the same as in the two cases mentioned, the limits being from the forehead above to

the costal margin below. Although the patient was not aware of it and suffered no discomfort whatever, I noticed that the intercostal muscles were not acting fully: the diaphragm was moving with perfect freedom. No nausea, vomiting, nor faintness were experienced. Subsequently the diaphragmatic excursions became much less extensive for some minutes, but the patient still remained comfortable. The pulse was very slow throughout, being not more than 42 to 58; this, however, was subsequently found to be normal in this patient. Respiratory rhythm remained constant at 30, the increase over the normal being probably accounted for by the extra labour thrown upon the diaphragm by the intercostal paresis.

The analgesia was perfect, and permitted of entire removal of the submaxillary and cervical glands and ligature of the lingual and facial arteries. Its duration was thirty-five minutes. The patient felt nothing whatever of the operation, and at its conclusion walked back to his ward. There were no subsequent complications except pyrexia of two days' duration, to the extent of 99.4°.

CASE XI.

C. R., aged 60, admitted for carcinoma of the cardiac end of the stomach. Patient was in a weak state, and the case was not in any way a promising one for gastrostomy, which was, however, attempted at his request.

The injection consisted of 6 cg. stovaine + 1 mg. strychnine, given through the dorsi-lumbar interspace, the patient being in the left lateral position, with the head of the table lowered. Analgesia did not extend higher than the nipples, and as he complained of pain as soon as the parietal peritoneum was incised, and when the stomach was pulled upon, chloroform was substituted and a Witzel's gastrostomy performed. No subsequent ill effects were noticed which could be attributed to the injection. The patient died at the end of forty-eight hours from exhaustion, the peritoneum being found at the autopsy clean and free from any leakage from the gastrostomy, which was sound.

CASE XII.

W. W., aged 40, admitted under the care of my colleague, Dr. Nixon Biggs, for otitis media. At the request of Dr. Biggs, who proposed to explore the mastoid antrum, I injected the patient between the first and second dorsal spines with 3 cg. stovaine + ½ mg. strychnine, in the sitting position.

The head was lowered as before, and in seven minutes the patient was analgesic from the vertex to the costal margin, with the exception of the nasal septum, the palate, and the pharynx. The tongue was analgesic in the anterior third. No trouble whatever was experienced by this patient either as regards his respiration or pulse, both remaining in every respect normal. There was no nausea, vomiting, or other unpleasant symptom. No pain was felt until the separation of the cartilage of the deep part of the meatus was attempted; this was apparently quite sensitive, although the bone was freely gouged without any pain, and it is possible that had cocaine been instilled the operation might have been completed painlessly. General anaesthesia was, however, substituted. There were no after-effects in this case.

The pain complained of was probably due to the immunity of the auricular branch of the pneumogastric nerve, this latter, like the glosso-pharyngeal, being apparently little affected by these injections.

CASE XIII.

L. C., aged 43, sent to me by Dr. Croft Watts, of Farnborough, for a large abdominal tumour of six weeks' history.

Patient was a woman of spare build and very nervous temperament, and her temperature suggested mild sepsis. An injection of 8 cg. stovaine + 1 mg. strychnine was given in the dorsi-lumbar interspace, the left lateral position being employed. On lowering the head end of the table, the analgesia rose slowly to the fourth dorsal area without inducing any untoward symptoms, the patient being quite comfortable. On opening the abdomen below the umbilicus the tumour was found to consist of the right ovary, which had attained the size of a Rugby football. To it the appendix was adherent, and from the right side of the uterus there grew a fibro-myoma of the size of a Jaffa orange. No nausea or pain was induced by any amount of traction on the pelvic organs, and accordingly the ovary, appendix, and the fibroid were removed without difficulty. The former contained 6 pints of fairly recent blood; the appendix was not diseased. Slight pyrexia for three days represented the only after-effect, and the patient made an uninterrupted recovery. The analgesia lasted an hour and a half, and was of the most perfect order.

CASE XIV.

H. P., aged 20, admitted under Dr. Nixon Biggs for submucous resection of the nasal septum. Injection was performed exactly as in Cases VII, VIII, X, and XII, except that in this case some cerebro-spinal fluid was drawn into the syringe so as to mix with the solution, the whole being then projected into the theca. I thought that in this manner I might cause a more general diffusion of the solution and thus avoid irregular analgesia. The patient was then placed upon his back and the head was lowered. Almost at once the patient's respiration became embarrassed and he became terrified, gasping for air, struggling on the table, and whispering that he was suffocating. It was seen that his diaphragm, although moving, was almost inactive, the intercostals being completely paralysed. He was reassured as to his safety, and in less than a minute his breathing became easier. His pulse and colour remained good, and in a short time he became calm. Strychnine $\frac{1}{30}$ grain was given hypodermically, but neither oxygen nor artificial respiration were employed. He was now found to be analgesic from the vertex to the costal margin, the pharynx and tongue alone being sensitive, and he consented to undergo his operation, which was easily carried out quite painlessly and with very little haemorrhage. Complete analgesia lasted thirty minutes. There was neither headache nor vomiting, and only slight pyrexia; next day he said he felt well, but acknowledged that for the moment he had been frightened at the operation.

CASE XV.

J. M., aged 40, admitted under Dr. Nixon Biggs for submucous resection of the septum of the nose. Injection was performed exactly as in the previous case, except that, in view of the obvious failure of the strychnine already recorded, the dose of this drug was increased to 1 mg. and the solution increased to a bulk of 1 c.cm., the stovaine remaining the same—namely, 3 cg. In two minutes from the time of injection the patient complained of nausea, and in five minutes he whispered excitedly that he was suffocating. In another moment it was seen that respiration was on the point of ceasing and that he was slightly livid. He was obviously terrified, and protruded his tongue convulsively with a licking movement, opening and shutting his mouth rapidly, and throwing himself into convulsions on the table. Although these movements of the body suggested opisthotonos there was no spasm of the muscles, and I fancy they were simply due to terror.

Artificial respiration was now commenced and a hypodermic injection of $\frac{1}{30}$ grain strychnine was given. Almost at once the colour returned, and in two minutes the patient was able to breathe with his diaphragm, his fear leaving him as his respiration improved. The analgesia was found to extend from the chin in front and the occipital protuberance behind to the umbilicus below. No other part of the head was analgesic, and taste and hearing were not affected. The pulse remained between 80 and 90 throughout, and was strong and regular. As analgesia was lacking, considering what the patient had undergone, it was determined to postpone the operation, and he was sent back to bed.

Seen next day, he was none the worse for his experience; he had not been sick and had had no headache; but he said that some years before he had been washed overboard and nearly drowned, and that the feeling when on the table closely resembled that of the initial stages of drowning. He had no pyrexia.

This case determined me not again to put any patient to the risk of such suffering by the employment of Jonnesco's method, so far as high injections were concerned, and proved to me incontestably that strychnine is by no means to be relied upon in these cases.

CASE XVI.

M. H., a woman aged 55, was sent to me by Dr. Fleming, of Haverstock Hill, for the cure of a gigantic umbilical hernia by the implantation of a filigree of silver wire.

I have seldom been able to accomplish these very extensive operations by the aid of spinal analgesia, but have always wished to do so owing to the greater relaxation of muscle and the absence of straining which it guarantees. This hernia measured 35 in. in circumference, and in the erect position extended downwards over the upper third of the thighs. The operation took place in the Hampstead Hospital.

An injection of 10 cg. stovaine (dry) + 1 mg. strychnine was given in the dorsi-lumbar interspace, the patient being in the sitting position. She was then placed on her back, and the head end of the table lowered. In five minutes the analgesia had extended to the level of the nipples, and in another minute was up to the third rib. The table was then levelled, and the operation was commenced. A large mass of omentum was ligated and removed, the sac cut away, and the intestines returned with some difficulty. The manipulations, however, produced no sensation of nausea or pain, and the abdomen was soon closed. The recti muscles were brought out of their sheaths, which were opened extensively for the purpose, and a filigree measuring 9 in. by 5 in. was implanted between the posterior layers of these sheaths and the muscles, which were then approximated over the filigree. The operation lasted fifty minutes and the analgesia ninety minutes. There were no after-effects of any kind except pyrexia for three days, ranging to 100°, but some days later the patient had a slight attack of pneumonia, and a mild one of facial erysipelas, from which she soon recovered. Her convalescence was rapid after this. During the operation the patient was comfortable and chatted freely, saying she much preferred the method to general anaesthesia.

CASE XVII.

W. K., aged 15 years 6 months, admitted for left renal calculus. Patient was placed in the left lateral position and an injection made in the dorsi-lumbar interspace consisting of 6 cg. stovaine + 1 mg. strychnine. The head end of the table was lowered, and at the end of a minute patient was turned upon his back. Analgesia extended to the level of the second rib. The bladder was washed out and a cystoscopic examination made; blood was found to be coming from the ureter of the suspected side, which fact strengthened the evidence of a somewhat doubtful skiagram. The patient was now turned over on to the sound side and nephrolithotomy was performed. Up to the moment of opening the kidney, these proceedings had been perfectly painless; now, however, he began to complain of dragging pain, and in a short time I was forced to resort to chloroform to complete the operation. The analgesia had lasted forty minutes and had been perfect, and had it not

been for the time taken up in washing out the bladder and by the cystoscopy, the main operation could easily have been done by this means alone. A small impacted calculus was found in the lower end of the pelvis of the kidney. With the exception of a single vomit fifteen minutes after injection, there were no after-effects of any kind. Pulse remained at 90 and respirations at 20 throughout; there was no shock, and patient was well and comfortable next day.

CASE XVIII.

R. T., aged 48, admitted for an irreducible inguinal hernia of gigantic proportions. In circumference it measured 35 in., and it depended to a point 16 in. below the pubic spine. The patient was a stoutly-built but rather plethoric man, and the risk of so prolonged an operation as would be required was fully pointed out to him. He begged that something might be done, since not only could he obtain no employment, but also the weight of the gradually increasing mass made it impossible for him to get about. He very pluckily agreed to take any risk, and this rather against my advice. Three weeks were spent in getting rid of some oedema of the scrotum and endeavouring to lessen the size of the mass, and then operation was performed. The injection was given in the right lateral position, and consisted of 7 cg. stovaine + 1 mg. strychnine given in the dorsi-lumbar interspace. The patient was put in the Trendelenburg position not only to cause the solution to rise in the theca, but also that gravity might assist in the return of the hernial contents. The analgesia rose to the nipples. On opening the sac, it was found to contain the caecum, appendix, ascending and transverse colon, 10 to 12 ft. of ileum, and a large mass of omentum. The latter was removed painlessly, and I then began to attempt to return the bowel. At the end of nearly ten minutes I had made little progress, and the patient was complaining of "pain in his chest" and had vomited twice; his pulse and respiration were both good. Chloroform was therefore substituted, very little being required to keep him fully under. Ultimately by returning the bowel inch by inch from the distal to the proximal end I succeeded in reducing the whole of it. As he showed no signs of shock I separated the neck of the sac from its surroundings without attempting to remove the body and fundus, and closed it. I then implanted two silver wire filigrees by the method I have elsewhere described,[2] closed the wound, and returned the patient to bed. As regards the analgesia there is nothing further to note; it failed, as so frequently happens where intestinal operations are concerned, to overcome the sensation of dragging and nausea. For any other than such operations it would have been ideal. As I had feared, the interference with the bowel proved to be too much for the patient; paralytic ileus set in twenty-four hours later, and in spite of a caecostomy done under local anaesthesia, the distension increased and he died from embarrassed respiration and oedema of the lungs. No pathological change of any sort was found in the spinal cord or meninges. Although I hesitated to perform this operation on account of the risk, I was encouraged to hope it might be successful, owing to the fact that three years ago I operated upon, and succeeded in curing by the double-filigree operation, a patient whose hernia almost exactly resembled the one here described, and which measured 25 in. in circumference and 15 in. in length. The operation was done under spinal analgesia.[3]

These, then, are the results I have obtained by the use of Jonnesco's combination, and it must be confessed that as a whole they are disappointing. The four successful cases of high puncture serve, so far as analgesia above the phrenics is concerned, to show that the method has, at least, *some* element of possibility in it; it is, however, uncertain, imperfect at present, and of doubtful value in replacing general anaesthesia. The unsuccessful cases of high puncture show it to be fraught with danger, and from the humane standpoint unjustifiable. The cases of low puncture serve to show very little else than that strychnine can be injected into the spinal canal without producing spastic symptoms, and that it undoubtedly results in a shortening of the period of analgesia usually resulting from the use of stovaine alone. The effects of the analgesic on the cranial nerves appear to be irregular. So far as I have been able to see, the first, second, third, and fourth remain unaffected; the fifth is at times under control, as is also the seventh; the sixth, eighth, ninth, tenth, and twelfth are unaffected, while the eleventh may or may not be paralysed. That the four last nerves should escape when the trigeminal is affected is a very remarkable fact, seeing that, lying in that portion of the base of the skull to which the injection has most ready access, they must of necessity be bathed in the solution.

It would certainly appear proved by Cases VI, XIV, and XV that stovaine is not a cardiac depressant, although it is to some extent a vaso-dilator, as shown by the slight fall of blood pressure which has been noticed in some of the 500 odd cases of spinal analgesia carried out in my wards at Greenwich.

I can see no object in adding strychnine to cases of low spinal analgesia, since I have found no difficulty in carrying out operations under stovaine analgesia without it, even when such analgesia has been pushed to the level of the clavicles. I do not mean by this that such a height is to be aimed at; even in skilled hands it is of doubtful safety; but, even if strychnine has been added to the stovaine to make it safer, it is still impossible to rely upon it in any particular case, and it is precisely this fact which has compelled me to forego the further use of Jonnesco's method. The idea it has in view is splendid, but to be of use it must show a high percentage of safety, and this condition it does not at present fulfil.

The above remarks, it must be remembered, apply solely to cases done by the stovaine-strychnine method, the results of which must not be confounded with those of the stovaine-glucose method of Barker. Of these latter cases, considerably over 500 have now been done in the wards of the Seamen's Hospital with perfect satisfaction to the patients, to myself, and to those of my colleagues who have given it a trial. I may say here that in this series, which extends over a period of three years, no case has as yet been met with in which there were alarming or dangerous symptoms either during or after operation; while the simplicity of the method, the comfort of the patient on the table, the immunity from unpleasant after-effects, and the saving of time which it ensures, combine to make it the method of election in cases suitable to its use. It is to me a matter of regret that I have been compelled, owing to the requirements of the authorities of the Naval Medical Service, to employ general anaesthesia in a certain proportion of my cases, in order to furnish material for classes of instruction in anaesthetics, to members of that service taking out courses in the London School of Clinical Medicine. That spinal analgesia is not yet a recognized branch of anaesthetics is to my mind, certainly so far as the Naval and Military Medical Services are concerned, a great misfortune, since it is in these services especially that spinal analgesia must find its highest sphere of utility.

REFERENCES.
[1] BRITISH MEDICAL JOURNAL, 1909. [2] Ibid., August, 1909. [3] Ibid.

Remarks

ON

ANAESTHETIZING PATIENTS FOR OPERATIONS ON THE THROAT, NOSE, AND ACCESSORY SINUSES.

BY

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THE increasing importance attached to anaesthetics, and the recognition of the fact that the anaesthetic is not the least important part of any surgical procedure, has prompted me to publish the following method, which I employ for anaesthetizing patients during operations on the throat, nose, and accessory sinuses. I have used the method for nearly four years, and lately its scope has been extended to operations on the mouth, face, and neck. The following article, however, is more particularly intended to apply to its adaptation to throat and nose work.

The routine method of anaesthetizing I employ is to induce anaesthesia with ethyl chloride and ether, and then after a varying time to substitute what we in Bristol call the "two-bottle" method—namely, a plain domette-covered mask (Murray's) and two drop bottles, one containing chloroform, the other ether. These two anaesthetics are added to the mask in such quantities and at such intervals as may be thought necessary, the smallest possible amount of chloroform being used, and at times altogether omitted, resulting in a pure, open ether administration. This method is superior to using a definite mixture of the two drugs, as the proportions can be so easily varied to suit individual cases.

On this method is based the one now to be described.

Anaesthesia is induced by ethyl chloride and ether, and maintained by ether vapour delivered to the patient

through a mouth tube from a Buxton's bottle of suitable size, with or without the addition of chloroform vapour from a second Buxton's bottle.

APPARATUS.

The apparatus, which is very similar to that of Mr.

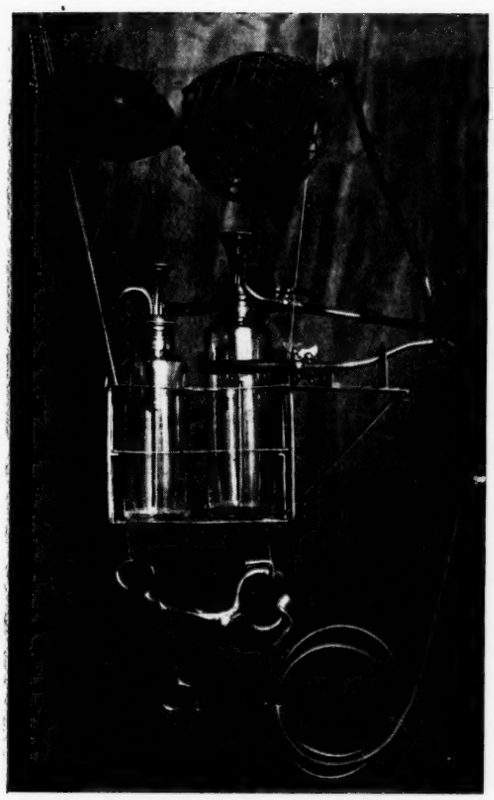

Fig. 1.—Apparatus complete. Hand blower attached.

Walter Tyrrell,[1] consists of two Buxton's bottles, held in a light stand. (Fig. 1.)

One bottle, for the ether, is a 4.5 cm. internal diameter, and deep enough to allow the surface of the ether to be maintained at least 6 cm. above the opening of the air inlet tube.

The second bottle, for chloroform, has the same internal diameter, and gives a column of chloroform 3.5 cm. above the opening of its air inlet.

These measurements I determined by experiment as being the smallest capable of supplying the amount of vapour required.

The inlet tubes of the two bottles are attached to a Y tube, through the stem of which air enters from the bellows. The exit tubes are similarly connected to a second Y tube, from which an india-rubber pipe conducts the vapour, or mixed vapours, to the patient.

I found from experience that the angle made by the limbs of the Y tube with each other was of some importance; it should not be greater than 58 degrees. Each limb must be provided with a stopcock, but to facilitate manipulation, instead of the usual small butterfly handle a straight one, 2.5 cm. long, should be fitted to each tap.

Into the angle formed by the limbs of the delivery Y tube is soldered a short pipe, 4 mm. internal diameter, provided with a stop-tap. This is connected to an oxygen cylinder, so that the gas may, if necessary, be given in conjunction with the anaesthetic. (Fig. 3.)

Another point I think of importance is that nowhere should supply or delivery tubes be of less than 3 mm. or more than 5 mm. internal diameter.

SOURCE OF THE AIR SUPPLY.

I at first worked with an ordinary hand blower with a bulb of 100 c.cm. capacity. This required the constant use of one hand, and occasionally failed to supply sufficient vapour. I then tried a foot blower made by Brown of Leicester, which has proved itself capable of any demand made on it. Its capacity is 305 c.cm., but worked in the ordinary way with the foot each compression gives an average of 260 c.cm. of air. The advantage of the foot blower is that both hands are free, and there is a large reserve of power if wanted.

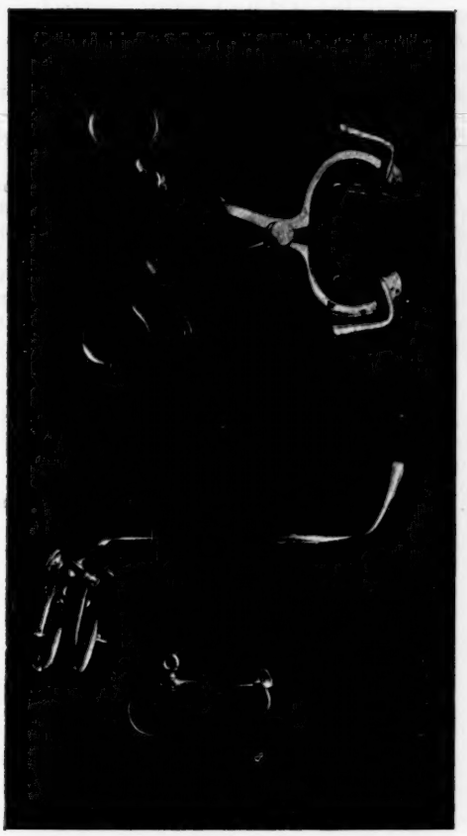

Fig. 2.—Watson Williams's post-nasal plug forceps and tongue hook.

THE GAG AND CHLOROFORM MOUTH TUBES.

The gag I use is of Doyen's pattern, but the toothplates are covered with soft lead. This prevents any damage to the teeth and obviates the risk of the ordinary rubber covering getting loose in the mouth. To each toothplate of the gag is attached a chloroform tube; it may be thought that this renders the gag slightly large, but it has this advantage—the tubes are always ready and cannot get lost.

That part of the chloroform tube attached to the toothplate is 3 cm. long, thus allowing it to project well into the mouth beyond the end of the toothplate, and ensuring the stream of anaesthetic vapour being carried well back towards the pharynx. The outer ends of these tubes are carried along parallel to the arms of the gag to keep them as much as possible out of the way. Fig. 2 will, I hope, make the form of both gag and tubes clear.

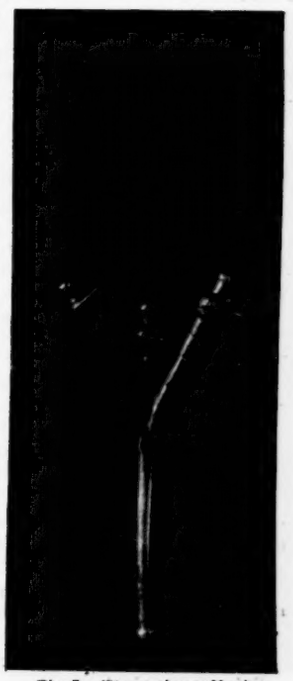

Fig. 3.—The delivery Y tube showing oxygen tube in centre. (Note.—The handles advocated are *not* attached to this tube.)

HOW TO MAINTAIN THE APPARATUS AT A CONSTANT TEMPERATURE.

A few trials of the apparatus showed that some means would be required to prevent the ether bottle freezing. Water vapour from

the air condenses in the ether, and, freezing, soon blocks the air inlet. I tried several plans, and finally found that standing the whole apparatus in a basin of cold water was sufficient to maintain the temperature of the ether bottle. This simple expedient absolutely prevents freezing, whilst without it the bottle is rendered useless in a very short time.

THE PERCENTAGE STRENGTH OF THE VAPOUR GIVEN OFF BY THE APPARATUS.

I made experiments to determine the percentage strength of the vapour delivered to the patient. They were made under working conditions as follows: Measured quantities of air were first *drawn* and then *pumped* through the apparatus; the amount of chloroform and ether evaporated in each case was estimated by the difference in weight of the bottle before and after the air had been drawn or pumped through, and from the temperature and barometric pressure the vapour percentage was calculated.

EXPERIMENT I.

A definite quantity of ether was placed in the ether bottle.
The bottle was placed in a basin.
Air was blown through by the hand bellows—

A. With the basin empty;
B. With water in the basin reaching halfway up the ether bottle.

The results of two out of ten experiments are given.

No. 1.

A.—*Basin Empty.*

Air.	Result.
After 30,000 c.cm.	Bottle covered with frost.
After next 20,000 c.cm. ...	Ice in ether; small cone of ice under air inlet tube.
After next 10,000 c cm. ...	Orifice inlet tube completely blocked with ice.
Total 60,000 c.cm. ...	Just over half the ether evaporated.

B.—*Basin Contains Water at 8.5° C.*

Air.	Result.
70,000 c.cm.	All ether evaporated; no sign of freezing.

No. 2.

A.—*Basin Empty.*

Air.	Result.
After 20,000 c.cm.	Bottle covered with frost.
After next 20,000 c.cm. ...	Ice in ether; small cone of ice under air inlet tube
After next 20,000 c.cm. ...	Air inlet completely frozen.
Total 60,000 c.cm. ...	Exactly five-eighths ether evaporated.

B.—*Basin Contains Water at 8.3° C.*

Air.	Result.
60,500 c.cm.	All ether evaporated; no sign of freezing.

N.B.—Every endeavour was made to keep the rate of pumping as uniform as possible throughout.

EXPERIMENT II.

This was made to determine the effect of alterations in the rate of pumping on the quantity of anaesthetic delivered to the patient, and shows that increased rate of pumping causes a given quantity to be evaporated in a shorter time. This corresponds to what I found to be the case in actual practice—namely, that the quicker one pumped, the quicker the depth of anaesthesia was varied.

One chloroform and one ether result are given.

1. The apparatus was placed in water.
2. Measured quantities of the anaesthetics were placed in the bottles.
3. Air was blown through at a definite rate.
4. This was repeated under exactly similar conditions, except that the air was passed through at twice the previous speed.

Example I.

Anaesthetic.	Rate of Pumping.	Time to Evaporate Given Amount.
		Min. Sec.
Chloroform	Slow pumping	28 50
Chloroform	Fast pumping	13 30

N.B.—Quantity of chloroform the same in both cases.

Example II.

Anaesthetic.	Rate of Pumping.	Time to Evaporate Given Amount.
		Min. Sec.
Ether	Slow pumping	5 5
Ether	Fast pumping	3 20

N.B.—Quantity of ether in both cases the same.

EXPERIMENT III.

The ether bottle standing in water was filled to its working level.
Air was *drawn* through the ether 5,000 c.cm. at a time.
After each 5,000 c.cm. of air had been drawn through, the amount of ether evaporated, by weight, was estimated.

No.	Air.	Time.	Amount of Ether Evaporated.	Per Cent. of Ether in Air.
	C.cm.	Min. Sec	Grams.	
1	5,000	5 52	7.8	33*
2	5,000	5 27	7.6	
3	5,000	5 7	7.0	
4	5,000	5 38	7.2	
5	5,000	5 13	6.8	
6	5,000	5 8	6.5	
7	5,000	5 2	6.1	
8	5,000	5 6	5.8	
9	5,000	4 52	5.2	
10	5,000	4 47	4.7	22

* The maximum and minimum percentages are alone noted.

The experiment was repeated under the same conditions, excepting that the air was *blown* through the ether, instead of being drawn through. It will be seen that in this way more ether was evaporated than when the air was *drawn* through. In each case every endeavour was made to bring the surrounding circumstances as near as was possible to those of actual practice.

No.	Air.	Time.	Amount of Ether Evaporated.	Per Cent.
	C cm.	Min. Sec.	Grams.	
1	5,000	0 58	15.7 (?)	
2	5,000	0 59	9.6	37*
3	5,000	0 58	8 9	
4	5,000	0 56	8 3	
5	5,000	0 57	7.7	
6	5,000	0 54	7.0	
7	5,000	0 55	6 6	
8	5,000	0 56	5.3	25
9	Bottle	Empty		
10				

* The maximum and minimum percentages are alone noted.

EXPERIMENT IV.

Air under exactly similar conditions was *drawn* through the chloroform bottle, filled to its working level and standing in water.

No.	Air.	Time.	Amount of $CHCl_3$ Evaporated.	Per Cent.
	C.cm.	Min. Sec.	Grams.	
1	5,000	6 16	4.1	13.7*
2	5,000	6 8	3.9	
3	5,000	6 16	3.8	
4	5,000	6 6	3.9	
5	5,000	5 59	4.0	
6	5,000	6 9	3.7	
7	5,000	6 22	3.9	
8	5,000	6 2	3.8	
9	5,000	5 42	3.9	
10	5,000	5 44	3.9	13.6

* The maximum and minimum percentages are alone noted.

On *blowing* air through the chloroform the following figures were obtained. As a contrast, the bottle in this case was *not* placed in water. Room temperature, 18° C.

No.	Air.	Time.	Amount of $CHCl_3$ Evaporated.	Percentage of $CHCl_3$ in Air.
	C.cm.	Min. Sec.	Grams.	
1	5,200	2 1	4.95	15.7*
2	5,200	2 5	4.75	
3	5,200	2 1	4.2	
4	5,200	1 55	4.15	
5	5,200	1 50	4.15	
6	5,200	1 50	4.05	
7	5,200	2 5	3.87	
8	5,200	1 45	3.87	
9	5,200	1 40	3.9	
10	5,200	1 30	3.5	12.7

* The maximum and minimum percentages are alone noted.

EXPERIMENT V.

This consisted of setting up the apparatus in its basin of water and blowing air through both bottles at the same time. The amount of each anaesthetic evaporated was weighed.

No.	Air.	Time.	Amount of $CHCl_3$ Evaporated.	Amount of Ether Evaporated.
	C.cm.	Min. Sec.	Grams.	Grams.
1	5,000	1 18	1.6	6.6
2	5,000	1 17	1.4	5.6
3	5,000	1 14	1.4	5.5
4	5,000	1 11	1.4	5.0
5	5,000	1 10	1.7	5.2
6	5,000	1 10	1.6	4.9
7	5,000	1 9	1.6	4.8
8	5,000	1 9	1.4	4.6
9	5,000	1 9	1.4	4.5
10	5,000	1 8	1.4	4.4

In this last observation the percentage composition of the issuing air varied from

5.8 per cent. $CHCl_3$ and 29 per cent. $(C_2H_5)_2O$
to 5.1 per cent. $CHCl_3$ and 21 per cent. $(C_2H_5)_2O$.

From these experiments I conclude:

1. That in *practice* the amount of anaesthetic in the air delivered to the patient increased with the rate of pumping.
2. That when the chloroform bottle stands in water the percentage in the issuing air is fairly uniform.
3. That the amount of ether in the air is not so constant, varying far more than the chloroform. As the air stream traverses a long or short column of the ether, so the percentage in the issuing air is more or less.

INDUCTION OF ANAESTHESIA.

The methods available are:

1. Chloroform.
2. Chloroform and ether ("two-bottle" method).
3. Gas and ether.
4. Ethyl chloride and ether.

I think chloroform alone should never be used for inducing anaesthesia if it can be avoided. The "two-bottle" method is always available, and I have never met a case in which it could not be used. When ethyl chloride and ether is contraindicated it will be found an excellent means of inducing anaesthesia, and, provided the induction is not hurried, is practically free from risk.

I have given up gas and ether as it is not always easy to prevent cyanosis, with salivation and secretion of mucus, which are to be specially avoided when adrenalin is used as a haemostatic.

Ethyl chloride and ether is used whenever possible; it produces less secretion and practically no cyanosis as compared to gas and ether. The objections raised, that it is more unpleasant for the patient, have no foundation, if carefully given.

To the Clover I use is attached a Hewitt's gas valve and a large bag. The inhaler is filled and the valves arranged so that the patient breathes "to and from" the air through the valve nearest the bag. A cubic centimetre of ethyl chloride* is introduced into the bag, the inhaler is now applied, and the valve nearest the bag gradually closed, so that the patient has slowly presented to him the dilute ethyl chloride vapour. As soon as the valve is closed the body of the inhaler is very gradually rotated in the usual way. In this manner the patient is anaesthetized without any unpleasant sensations of choking. Swallowing and holding the breath are avoided. Directly the patient is under, the air valve nearest the bag is opened about $\frac{1}{32}$ in. and is kept so, thus allowing an admixture of fresh air with the ether vapour.

Given in this way, it takes from one to two minutes longer to get the patients under, but the distressing sensations complained of in the ordinary method are absent, and secretion of mucus the exception.

CHANGING TO THE OPEN METHOD.

As soon as the patient is under, the gag is introduced and pumping started.

In cases induced with ethyl chloride and ether, the ether taps alone are opened, pumping is started at first slowly, then more quickly, and in a very short time the patient can be got deeply under ether.

Anaesthesia is maintained by varying the rate of pumping, so as to regulate the depth of anaesthesia to the requirements of the moment.

Should the patient tend to come round when the ether is first administered from the apparatus, the admixture of a small quantity of chloroform vapour from bottle No 2 is all that is necessary; as anaesthesia deepens the chloroform is gradually lessened until only pure ether is being given.

If, on the other hand, anaesthesia is commenced with chloroform and ether, start with the mixed vapours, from the apparatus, and gradually lessen the chloroform, watching all the time for any sign of secretion. In a large percentage of cases open ether can be given with impunity, but if it is seen that the patient will not take the open ether, then try until the largest percentage of ether and the smallest of chloroform the patient will take is found. I have not met a case in which some ether could not be given with the chloroform. If it is evident from the first that pure ether is inadmissible, start with the mixture and then arrange it as above.

In starting always be most careful to have a weak vapour, the strength of which is gradually increased by regulation of the taps, with more forcible and frequent pumping.

When changing from a mixture of chloroform and ether to ether or chloroform alone, the stream of air passing through the anaesthetic must be lessened, for, if this is not done, shutting off the one anaesthetic will increase the amount of the other, as the air stream, having a lessened channel to pass through, must do so more quickly, and, as we have seen above, the amount of anaesthetic delivered

* I am indebted to my colleague, Mr. A. L. Flemming, for bringing to my notice the efficiency of such small doses of ethyl chloride.

to the patient will under these conditions be greater than it was in the mixture.

Under no circumstances change from ether to chloroform unless the corneal reflex is present. The points to aim at during the administration are—a light anaesthesia with avoidance of secretion.

In cases where cocaine has been used a very brisk corneal reflex can be maintained all the time, unless the operator should go beyond the insensitive area. If no cocaine has been used, it is necessary to keep the patient more deeply under, but the corneal reflex need not be abolished. I never work with the corneal reflex gone if I can possibly help it.

It is not necessary to keep the patient at one uniform level of anaesthesia. Always try and suit the depth to the manipulations of the moment, and in this way I believe the patient is spared a lot of the unpleasant after-effects of the operation.

Secretion is one of the most difficult problems to be dealt with in these cases, especially if adrenalin has been used, because the surgeon so often requires the patient's head placed in the mid-line, so that it is impossible for the secretion to gravitate into the cheek and so out of the mouth. Instead it tends to fall back into the pharynx and larynx.

However, minute care in the induction and maintenance of anaesthesia on the lines suggested will in the majority of cases free us from this trouble. Much secretion means (1) cough, (2) intercurrent asphyxia, (3) chronic oxygen starvation.

The Type of Anaesthesia.

Patients anaesthetized with the mixed vapour present the same features as do those anaesthetized with a mixture of the two drugs, given on a mask in the usual way. In those anaesthetized with ether vapour alone the face is slightly flushed; the pupils, usually somewhat contracted, vary with the depth of anaesthesia; respiration is regular, soft snoring and moderately deep; the pulse full, regular, and slightly quickened. The colour remains good, even when deeply under. In the majority of cases there is little if any secretion and very little sweating.

Haemorrhage.

The control of haemorrhage naturally falling under the care of the surgeon, the anaesthetist is simply concerned with the method of preventing access of blood to the larynx.

When the source of bleeding is outside the mouth or nasal cavities, it does not directly affect the administrator, but bleeding from within the mouth and nose, as in nasal operations, does directly affect him, and he should be prepared, in conjunction with the operator, to take such steps as will prevent its reaching the air passages.

When the source of bleeding is within the mouth sponging only can be resorted to, and it is usually arranged by the surgeon whether the assistant or the anaesthetist shall undertake the duty.

In antral operations where bleeding comes from between the cheek and gum, a long roll of wool packed between the teeth, from the mid-line in front to the ramus of the jaw behind, makes a watertight joint, and at the same time I am in the habit, unless the surgeon object, of having the naso-pharynx plugged.

During operations within the nose or on the frontal sinuses, blood can be prevented from escaping through the posterior nares—either by plugging them or the naso-pharnyx.

The posterior nares are plugged by gauze passed through from the front; the naso-pharynx by a sponge passed up behind the soft palate, preferably with Watson Williams post-nasal plug forceps.

The arguments in favour of plugging the posterior nares are:

1. Less bleeding.
2. No risk from the pharyngeal reflex.
3. The airway is not obstructed by bulging forward of the soft palate.
4. There is less risk of secretion of mucus from irritation of the pharynx.

But in favour of the naso-pharyngeal plug, which I strongly advocate, it may be said:

1. It does not increase the bleeding.
2. I have never seen it produce reflexly any ill effect.
3. The airway is easily kept patent by drawing forward the tongue.
4. Properly introduced and kept in its right place, it gives rise to little if any secretion.

Further, it can be easily, almost instantaneously, applied after very little practice. The posterior nares are plugged with difficulty, the gauze tending to find its way into the naso-pharynx, a watertight joint being very difficult to obtain, whilst if any operation has to be done on the sphenoidal sinus or posterior ethmoidal cells, the gauze will be in the way.

To introduce the post-nasal plug, which is best made of marine sponge, fix it firmly in the forceps (Fig. 2), pass it to the back of the mouth, as if its destination was the larynx. When on the posterior pharyngeal wall, below the soft palate, rotate it upwards through half a circle, when it easily slips into place, and, finally, depressing the handles, push the sponge home. The forceps are left on. Dr. Williams uses a special form of retractor to pull the soft palate forward and thus facilitate the introduction, but this is not absolutely necessary. The right size of sponge is soon learnt by practice; it should be introduced without fumbling or mucous secretion may be set up; the patient must be sufficiently under to prevent difficulty from contraction of the muscles of the palate and fauces.

On examining the soft palate, after introducing the plug, two things will be noticed—small beads of mucus standing out on the buccal surface, and a bulging forward and downward of the soft palate itself. If deftly introduced and the forceps steadied by the anaesthetist, no further secretion takes place. Should free respiration be interfered with by the bulging palate meeting the dorsum of the tongue, the small tongue hook (Fig. 2) hooked into the tip of the tongue in the mid-line will draw it forwards and clear the airway.

On the tongue hook will be noted a small ring; this can be slipped over one of the hooks on the plug forceps, thus mechanically holding the tongue forward and obviating the necessity of using the hand. There is no necessity to forcibly drag the tongue out, just sufficient tension to clear the palate being all that is required.

This may seem complicated, but the plug can be introduced and the hook fixed in a few seconds, giving a free airway, an absence of all anxiety relative to blood entering the larynx, and the advantage of being able to place the head in the mid-line without the tongue falling back. I have only heard of two patients who complained of this tongue hook—one in private and one in hospital practice. Patients when questioned next day always say they have no discomfort.

The effect of the anaesthetic on haemorrhage when care is used is not so great as some would have us suppose. Chloroform, chloroform and ether, and ether, in the order given, cause increasing amount of haemorrhage, but the amount caused by ether given with care is, in my experience, so little in excess of that produced by chloroform, that it is usually impossible to say from the amount of haemorrhage which anaesthetic is being used.

If a patient is kept cyanosed, whether from injudicious ether or obstructed airway, he will bleed, and under these circumstances it is hardly fair to blame the anaesthetic.

It occasionally happens that patients whose nasal passages have been plugged previous to operation give some trouble whilst going under with ethyl chloride and ether. Breathing takes place through the mouth until consciousness is lost, when an attempt is immediately made to breathe through the plugged nose, and it will sometimes take a lot of "dodging" to get a return to oral breathing. The best way is to use a large facepiece and to insert a small mouth-prop, when very little trouble will be experienced. The difficulty with these cases is that they refuse to breathe except through their plugged nostrils.

When anaesthesia is induced by chloroform and ether, patients with their noses plugged take longer to go under, but the same difficulty is not experienced with their breathing.

At the conclusion of an operation where the post-nasal plug has been used, after the patient is cleansed, the head should be turned on one side and the opposite shoulder raised; the tongue hook is removed but the gag left in. In this position the patient remains until it is judged that

he is sufficiently round to obviate all danger of blood entering the larynx. The post-nasal plug is now taken out; some blood is sure to be retained above it, and this, when it finds its way into the pharynx, can be sponged out. The gag should next be removed. The reason for leaving it in so long is to render the swallowing of blood more difficult, a thing to be avoided as likely to cause vomiting.

The patient is taken back to bed on his side, and kept in that position under efficient observation until round.

It perhaps hardly comes within the scope of the anaesthetist to apply haemostatic measures, although, in common with the operator, he may suffer from the want of them; but in intranasal operations by far the best results I have seen have been obtained by packing the nose just before the operation with separate small pieces of gauze, wrung out of a solution of 10 per cent. solution of cocaine with adrenalin (1 in 5,000), the strips being applied to the spot to be operated on by aid of speculum and forceps.

Management of the Secretion of Mucus and Saliva.

In cases anaesthetized for nasal operations, in the manner described above, trouble occasionally arises from secretion of mucus and saliva. This is practically always due to the adrenalin used, and constitutes the chief difficulty with which we have to deal; many of the cases do not secrete at all, and the rest if properly managed will give no trouble. But occasionally a case is found where the secretion is a nuisance, preventing a smooth anaesthesia and taxing the skill of the anaesthetist to the utmost. It is often necessary to keep the head raised and in the middle line: this greatly adds to the trouble, as the usual course of lowering the head and turning it on one side cannot be resorted to.

Secretion interferes with free respiration and so causes cyanosis, which begets more secretion; thus if great care is not taken a vicious circle is started, soon leading to a most undesirable state of things. Fortunately it is nearly always avoidable, and when it does occur is fairly easily managed.

Secretion is caused by (1) adrenalin used as a haemostatic, (2) the anaesthetic, (3) mechanical irritation by plugs and injudicious swabbing of the fauces, (4) cyanosis.

Adrenalin.

One action of this substance is to cause a secretion of thick mucus and saliva.

Now, this result has been said to occur only after adrenalin has been injected. But I have seen it after its application to the mucous membrane, and especially after it had been used to stop bleeding, when there was much raw surface, especially so if the solution was a strong one. From a few experiments I have tried on myself, I concluded that ether increased the secretion when a strong solution of adrenalin was used; but with a weak solution I could get no definite proof of this action.

The Anaesthetic.

Of the two anaesthetics, ether is the most troublesome in this respect; a strong ether vapour, as is well known, tends to cause both salivation and secretion. The importance of a careful induction has already been insisted on. When open ether vapour is first administered, it will be found that by gradually increasing the strength until tolerance is fully established, very little if any secretion will result, and this soon stops. An attempt to save time by getting the patient under quickly is much to be deprecated, as it is a very usual cause of this trouble.

Mechanical Irritation.

If the post-nasal forceps are not kept still, secretion will be set up. If steadied by one finger this trouble can be avoided.

Rough and unnecessary sponging-out of the pharynx is another and fruitful source of mucous secretion. It should be done as seldom and gently as possible.

Cyanosis.

As one of the first and constant cares of the anaesthetist is to keep a free airway, cyanosis should not occur. But if it does—and for some reason the cause cannot be entirely removed—give a very small quantity of oxygen with the anaesthetic, just sufficient to keep the patient a good colour. On the few occasions I have had to use it the result was excellent.

There is one point in connexion with this question of secretion to which I wish to draw particular attention. In those cases where I have had trouble adrenalin has always been used. In a series of cases where I used this method of anaesthetizing patients for operations, both on the nose and on other regions, where adrenalin was not used, I had no difficulty from the secretion. These control cases show that the extreme amount of secretion occasionally met with is not due to the ether.

Cocaine and Adrenalin.[2]

When anaesthetizing patients for operation who have just previously been treated with one or both of these drugs, the following considerations should be borne in mind.

Under certain conditions both are poisons. The peculiar idiosyncrasy to cocaine shown by some people is well known; nevertheless I have only once seen symptoms arising from this cause. In this case the larynx was painted with 20 per cent. cocaine for bronchoscopy. Towards the end of the examination the patient showed symptoms only attributable to the cocaine. These gradually passed off. Anaesthesia was induced with chloroform and ether and maintained by a little ether. But although this is the only case I have had personal experience of during anaesthesia, I have several times seen patients exhibiting toxic symptoms after their mucous membranes had been painted with cocaine; therefore the possibility of such symptoms occurring should not be forgotten.

With adrenalin I have several times seen a group of symptoms appear which could only be attributed to its action. They have been specially marked after it had been applied to a raw surface to stop bleeding. Twice they have appeared after the nose had been packed with strong adrenalin without any breach of the mucous surface. These symptoms, which I have only seen when adrenalin was used, are a rapid pulse—from 120 to 200 per minute—a peculiar "floppy" heart action, profuse sweating, and secretion from the pharyngeal and tracheal mucous membrane. What the blood pressure is I am unable to state, never having measured it under these circumstances. I have never found glycosuria in any of the cases treated with adrenalin.

Surgical Shock.

Except in some cases of submucous resection of the nasal septum, surgical shock is not met with.

Here symptoms of both respiratory depression and cardiac shock have shown themselves—namely, shallow, irregular breathing, and a slow, weak pulse, always during that part of the operation dealing with the cartilaginous septum. Directly the septum is removed, and the bony crest is being dealt with, these symptoms pass off. Once or twice, when giving chloroform to these cases, they have caused me some anxiety. The explanation is that during the manipulation of the cartilage the naso-palatine branches of the fifth cranial nerves are stimulated, and through the connexion of the reception nucleus of the fifth nerve with the vagal nucleus inhibiting impulses reach the heart. It is well known that excitation of afferent fibres of the respiratory tract will produce cardiac inhibition, arrest of respiration, vaso-dilatation, and fall of blood pressure.[3] The afferent paths, that is to say, the naso-palatine nerves, being divided with the cartilage, the stimuli cannot pass. Therefore, when the cartilage is removed the symptoms disappear.

I now give all cases of submucous resection submitted to general anaesthesia, ether, and since doing so I have only seen these symptoms in a very much slighter form, never sufficiently marked to give rise to the slightest anxiety.

After-Effects.

These have been slight. There has been no case of pneumonia, and only one of very mild bronchitis due to blood accidentally entering the bronchi. There have been no other respiratory complications.

Vomiting: as in a large measure the comfort of the patient depends upon the amount of vomiting, I have followed my after-results closely. At first sight they do not appear good, but it must be remembered that most of these patients swallow some blood, and in my experience this is practically always vomited. Then, as the majority of the vomiting takes place before complete consciousness is established, the patient knows little or nothing about it. In only one case was treatment for the vomiting required—in that of a woman who vomited for twenty-four hours (after an operation on the sphenoidal sinus).

If the number of times that the patient vomits may be taken as a rough index of his feelings after an anaesthetic, the following table will be of interest. It must be remembered, however, that he may vomit once or twice before fully round. All the patients were prepared after the manner advocated by Mr. A. L. Flemming,[4] and the vomited matter has consisted practically of blood or altered blood.

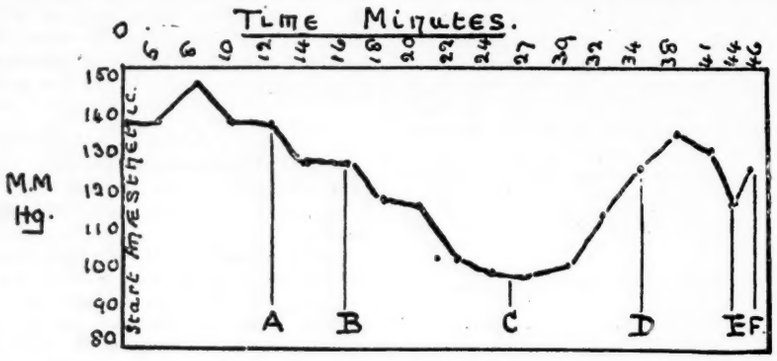

Fig. 4.—Blood pressure. Submucous resection. A, Start separating mucous membrane. B, Separating mucous membrane opposite side. C, Cartilage divided. D, Anaesthetic stopped. E, Vomiting. F, Patient conscious.

Of the cases on whom these observations were made—

Vomited.	Did not Vomit.
77 per cent.	23 per cent.

Of the patients who vomited—

30	per cent. vomited	Once.
27.5	per cent. vomited	Twice.
25	per cent. vomited	Three times.
5	per cent. vomited	Four times.
2.5	per cent. vomited	Five times.
5	per cent. vomited	Six times.
*5	per cent.; vomiting lasted over twelve hours.	

*One case vomited for twenty-four hours, and required special treatment.

Conclusions.

From the foregoing remarks it will be seen that patients anaesthetized by this method are easily given open ether for operations on the throat and nose. The chief difficulty met with is excessive secretion, which I have never seen unless adrenalin had been used. This excessive secretion has only followed the use of strong and never the use of weak (1 in 5,000 and under) adrenalin.

The method of using the post-nasal plug has been described at length; having once tried it on a suitable case, no one, I am sure, would ever be without it.

Another point I wish to emphasize is the reflex effects occasionally met with in submucous resections. From my experience I very strongly advocate ether for these cases when a general anaesthetic is used.

The accompanying chart of the blood pressure from such a case is, I think, worthy of study, and I am indebted to Dr. Watson Williams, under whose care the patient was, for permission to make the observations. (Fig. 4.)

I was unaware until the publication of Dr. A. H. Miller's[5] paper of his work in this connexion, but I am very glad to see the favourable account he gives of his results, which confirms my good opinion of open ether for the class of case under consideration. When its technique has been mastered it will be used, I am sure, in preference to any other method.

It must not be thought that on account of the prominence given to the difficulties found in anaesthetizing these cases that they are of frequent occurrence; on the contrary, they are the exception. It has been done with the view of suggesting how to manage them when they do occur.

I have to thank Professor Francis Francis and Mr. O. C. M. Davis (Bristol University) for much help in the estimation of the chloroform and ether percentages. These represent the maximum output of the machine under average working conditions. I wish particularly to draw attention to the strength of the chloroform vapour. The greatest care should be taken when using chloroform alone, but when the mixture is used, the strength of the chloroform vapour presented to the patient is diluted by the inspired air to a sufficient extent—not that this factor should make us any less careful.

With regard to the ether percentages, I am unaware what percentage strength of ether vapour is required to produce anaesthesia, but I do know that the percentage produced by the apparatus is more than is required. It is surprising what a weak ether vapour, continuously given, is required to keep a patient under. Much is harmful, giving rise to the unpleasant symptoms associated with the drug.

[I am indebted to Messrs. Down Bros. for much help in the actual manufacture of the apparatus.]

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[1] *Trans. Soc. Anaes.*, vol. i, p. 1, 1898. [2] J. N. Langley, *Journ. Phys.*, vol. xxvii, p. 237. [3] Brodie and Russell, *Journ. Phys.*, vol. xxvii, p. 92. [4] A. L. Flemming, *Bristol Med.-Chir. Journ.*, March, 1909. [5] A. H. Miller, *Journ. Amer. Med. Assoc.*, vol. liii, No. 17.

STATE INSURANCE AND THE POOR LAW COMMISSION.

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The Poor Law Commissioners have differed widely in opinion as to the best means of dealing with pauperism and poverty. In one thing, however, they are agreed. They have given it as their unanimous verdict that not a little of the poverty and pauperism in this country is due to the fact that there is no provision for adequate medical attendance. Nor can we deny it. The remedies put forward in the Majority and Minority Reports are generally regarded by medical men as unsatisfactory. The question now is: Are we ourselves prepared to bring forward a remedy? There can be no doubt that, though somewhat late in the day, there is now a decided movement in that direction. A scheme of medical attendance has been discussed at the Representative Meeting, and will be sent down to the Divisions, when every member will be free, and it is to be hoped prepared, to give his opinion. Of course, we are aware that the British Medical Association does not embrace the whole medical profession. Objections have been made to its constitution and management; the Association is on a democratic basis, and these are open to remedy; and of this, at least, we may rest assured, that if any scheme of medical attendance is to be brought forward, it can only be under the auspices of the British Medical Association. There is no other body at present in existence that represents the interests of all and is numerically strong enough to deal with it.

In endeavouring to contribute towards the solution of this question I make no secret of the fact that some years ago, after long pondering the subject, I came to the conclusion that the best remedy is State insurance; nor have I since discovered any reason why I should depart from that conclusion. State insurance has been in force in Germany for more than a quarter of a century. We can now study it in all its details. We can see in what

manner it has affected national life, and how far it has succeeded and how far it has failed in solving those problems that are confronting every European nation. No one can claim that it has as yet proved an unlimited success, or that we ought slavishly to follow the trend of its development on the Continent. But what I contend for here more especially is that, as regards medical attendance, it goes farther to remedy the defects complained of in the Poor Law Report than any of the proposals brought forward by the Poor Law Commission.

Wherein have we failed? As regards medical attendance under the Poor Law, the Commission affirm that district medical officers are poorly paid; that their attendance is perfunctory; that they cannot afford to give the medicine required; and, as regards the nation at large, they lay strong emphasis on the fact that the poorer classes have often great difficulty in obtaining medical attendance; that much of the attendance given is unsatisfactory; that there is overlapping; and that too little is done for the prevention of disease.

In order that we may form some idea as to how far this criticism is justified, let us, putting aside for the meantime attendance under Poor Law and public health, glance at the different systems under which the great body of the people are being treated for the cure of disease.

I.—Private Practice.

This system still holds good to a large extent among the working classes in the North of England and Scotland, and to a considerable extent in rural districts generally. Were it practicable there are probably but few medical men who would not say that it is, after all, the best. Unfortunately it is not always practicable. Take, for example, a district at my own door. There is a population of about 7,000, consisting of publicans, small shopkeepers, artisans and labourers. Many, who are not paupers, are attended through medical orders which are freely given. A number are in clubs and in a provident dispensary. Others are attended by medical men who charge 6d. or less for advice and medicine, and up to 5s. a week when they are visited daily. The greater part are attended free of charge by hospitals, and confinements by midwives. The consequence is that in this population there are not ten private patients. Many of the people living in this district have a good income, and can well afford to pay the ordinary private fee or a much larger sum than is paid to clubs or provident dispensaries. There are others—and it is this class with which the Poor Law Commission largely deals—who are not in a position to pay even 6d. for advice and medicine. Letters have from time to time appeared in the JOURNAL, mostly from practitioners in country districts, who say that a considerable part of their income is derived from the yearly or half-yearly bills paid by men earning not more than 16s. a week, and they naturally ask why there should now be a flood of proposals for doing away with private practice. I have gone over many family budgets of those living in town and country, and reckon that those earning 16s. a week in the country are as well off as those earning 27s. or 28s. a week in the large towns, and, unfortunately, there are millions of our urban population living in houses where the income is less than that amount. Or take another extreme instance. There are districts in the West Highlands of Scotland where, according to the Registrar-General's Return, about half the people die without medical attendance. There, too, Poor Law and private practice have utterly failed.

Here, then, we are faced with a difficulty which I cannot pretend to solve. In some parts of the country private practice has succeeded, in others it has all but entirely failed. The consequence is that legislation well adapted to meet the needs of some parts of the country might prove detrimental to others. In legislating for the future there is, however, one fact that ought to be considered—namely, that the mode of life in this country is rapidly changing. Railways, motors, telegraphs, newpapers, and the transference of large industries to rural districts are altering the conditions of life, and life in the most remote country village is being rapidly assimilated to that in the towns. In these circumstances it seems not unreasonable to anticipate that private practice among the working classes may by and by become a thing of the past.

II.—Voluntary Insurance by Means of Clubs, Friendly Societies, Provident Dispensaries, etc.

The relationship between medical men and the working classes as affiliated to clubs and friendly societies has, not only in this country, but throughout Europe, been far from what might be desired. Disputes have arisen which I would not willingly say one word to accentuate. No one can possibly question the fact that the working classes have gained much by combination, and that the claims on the Poor Law have thereby been much diminished. At the same time it is evident, as was repeatedly pointed out to the Poor Law Commission, that there is a large body of poorly-paid workers who do not profit by voluntary insurance, and but little is done even for the skilled artisan who, through family circumstances, seasonal or bad trade, is unable to continue his subscriptions. In these circumstances some have thought that in framing an insurance bill Mr. Lloyd George has shown himself but too anxious to propitiate friendly societies. At the same time it must be remembered that in an insurance bill the provision of support during illness is of as much, even of more, importance than that of medical attendance. A further reason may have been that the friendly societies were more pressing in their demands than the members of the medical profession. Be that as it may, he has now told us that before that bill is brought forward we shall be consulted; and if, after all, we find that it is passed in the interest of only one party in the State, it will be our own blame if it does not meet with the most strenuous opposition.

As for the proposals of the Majority to solve the question of medical attendance by increasing provident dispensaries to which paupers would be admitted, I do not suppose that practically any medical man takes them seriously. At the present time, notwithstanding every effort on the part of boards of guardians and others, considerably less than 1 per cent. of the population belong to provident dispensaries, and I have heard of no medical man, except Dr. McVail, who believes that, though a subsidy were granted by the State, they would be materially increased.

III.—Charity through the Medium of Hospitals, Medical Missions, etc.

For a century or more it has been quite evident that in large cities at least private practice and voluntary combination would have utterly failed had there been no Poor Law and no hospitals. As Dr. Major Greenwood has clearly shown in a recent article, there was a time, after the breaking up of monasteries and the advent of Poor Law and philanthropic institutions, when the poor must have greatly suffered through the want of medical attention. Hospitals have since done excellent work, but, as we general practitioners well know, they have developed in a manner detrimental not only to our interests, but, as we believe, to those of the community. Some feeble attempts are now being made to stem the increasing tide that is rushing to out-patient departments.

I have before me the report of the first year's working of the lady almoners of the London Hospital. The report is thoroughly honest. It shows how the attempt to prevent this abuse of hospitals has been a mere drop in the bucket. After giving a sample of the well-to-do people who sponge upon hospitals, we have the statement that "the chairman has informed us that the committee intend to prosecute such cases in future for obtaining goods under false pretences." Is it likely? We have heard that so often before, but of the tens of thousands not one has been prosecuted. In the same report is mentioned the case of a woman who "was attending no less than six hospitals, and drinking medicine from each." The Minority have given us an alarmist report as to the sufferings of the poor through the difficulty in getting medical attendance. If general practitioners had been asked they could have readily given a few paragraphs to show that many poor are at the present time suffering from an excess of medical attendance. If I may be allowed to express my own personal opinion—and it is founded on daily contact with facts—it is drink, gambling, and out-patient departments that at the present time are in our large cities the most powerful factors in demoralizing the people and in leading to pauperism.

We have thus seen that, while in some parts of the country private practice meets the necessities of the case,

in others it has utterly failed; that voluntary assurance provides only for a certain section of the community, and that charity has developed in a manner prejudicial to the welfare of medical men and to the country at large.

IV.—Compulsory Insurance.

There are many respects in which our present position in this country resembles that which existed in Germany before compulsory insurance was introduced. There had been a gradual exodus from the rural districts—where the landlord or employer often paid for medical attendance—into industrial centres where it was seldom that any provision was made. That voluntary insurance had done something is evident from the fact that some years before the compulsory bill was passed there were over 5,000 clubs or friendly societies in Germany, with a membership of nearly 1,000,000. There were hospitals, but on a much smaller scale than in this country.

The position was not satisfactory. The Emperor William I and Bismarck pondered much over it. During that reign much had been done for the worker. He had got freedom of contract, and could hold his own with the employer. It was felt that that freedom had been purchased at too great a price if he were driven to the wall, and no provision was made for support and medical attendance during illness contracted, it might be, through the altered conditions of life or the nature of his employment. In this country we have begun with old age pensions, which are non-contributory. In Germany they began with sickness, and in doing so I think they took a more reasonable course. As Dr. Zacher has said:

> Insurance against sickness is the oldest and most embracing, because on the one hand the necessity of provision for the sick makes itself the oftenest and most urgently felt, and on the other hand, owing to the temporary nature of that necessity, it can be most readily relieved.

It is not necessary to give in detail an account of State insurance in Germany and other countries. These details have been given in this JOURNAL in April last. To save the trouble of immediate reference I will describe it in a few words: The bill for sick insurance was passed in 1883. Its main principles are that every worker (all are not yet included), male or female, over 16 years of age, and earning not more than what is equivalent to about 38s. a week, should be compelled to pay for medical attendance; that the amount paid by the workers (not the doctors' fee) should be graduated according to the wage received; and that to the payment made by the worker the employer is compelled to add 50 per cent. The manner in which payment is made is by a deduction of 1 to 2 (in special cases up to 4) per cent. from his wages, and the money is paid by the employer into the insurance office.

In return for the payments made by employers and employed the worker receives half his weekly wage during illness, and medical attendance, medicine, trusses, spectacles, etc, free of charge. He may, as we shall afterwards see, in some districts call in any doctor, in others he is limited in his choice. The rule is that a note be taken from the employer, but if that is not convenient at the time it can be handed in afterwards. There has been no complaint as to delay on that account. If the medical attendant thinks it advisable that he should be sent to the hospital, there is no difficulty in obtaining admittance, as from the sum deducted from wages, to which the contribution has been added from the employer, a payment for each patient is made. And here, by the way, I may add that, though I have read the German medical journals for a considerable time past, I have never seen a single complaint as to any difficulty in admittance or as to any abuse of hospitals. For the purpose of carrying out this work societies are formed on territorial or other grounds. There are, for example, municipal sick societies, societies connected with large works, trade societies (building, mining, etc.), and others adapted to special circumstances or to the continuity of voluntary societies that existed before compulsory insurance came into force.

In 1884 a compulsory accident insurance bill was passed, according to which workers earning not more than somewhat under £3 a week receive after the first thirteen weeks, during which they draw on the sick assurance fund, two-thirds of the usual wage, while a provision is made for wives and families. The money required is paid by the employer.

In 1891, in order to provide for those not covered by the sickness and accident bills, an invalidity and old age bill was passed. In this case the employer pays an amount equal to that deducted from the worker, while a subsidy of about £2,000,000 is paid by the State.

In addition to the above the worker may, if he chooses, by further payment secure greater advantages, or he may contribute to other forms of insurance that are not compulsory. I spent some time lately in endeavouring to discover what effect compulsory insurance has had on clubs and friendly societies, but was assured at the Government offices in Berlin that my search was useless, as no reliable statistics could be obtained.

Germany took the initiative in State insurance, and it is in that country the greatest advance has been made. A careful study not only of the original bill, but of its development during more than a quarter of a century, is necessary for the preparation of any bill that will adapt itself to our national needs. Statesmen, ecclesiastical and social leaders, have evidently made up their minds that a bill of some sort must be passed, and, as Professor Moore has said, were we as medical men to oppose it, it would be equivalent to butting our heads against a stone wall. It is incumbent on us, therefore, to go thoroughly into it. How far Mr. Lloyd George and other statesmen have made inquiry I am unable to say. At the sick-insurance offices I have visited in various towns there is no lively recollection of any inquiry having been made. In any case, it is scarce to be expected that, beyond trying to discover what would affect the nation at large, they would devote much time to matters that are of special interest only to medical men.

That compulsory insurance has proved an unmitigated success in Germany is more than its most enthusiastic advocate can claim. Bills were produced when there were few data and no experience on which to proceed. This has rendered the position more difficult. In this country, with the exception of the Old Age Pension Bill we have a clean slate, and there appears to be no reason why in these circumstances we should not evolve a system superior to any that exists on the Continent.

I cannot now refer to all the difficulties that have cropped up during the development of State insurance. Suffice it to say that they are mostly due to the fact that the three bills mentioned were passed at three different dates. Employers do not always know to whom to pay their subscriptions, and employees do not always know to whom to apply. The different societies to which I have referred are most confusing, to an outsider at least. In Leipzig, which I have always, rightly or wrongly, regarded as a model of management, there is one society with about 170,000 members. In Berlin the number of societies, up to recently at least, was 155. This and much else could be readily simplified, and the cost of management, which is at present from 5 per cent. to 10 per cent., could be still further diminished had there not been mistakes in the past.

A strong attempt is now being made to remedy these defects. A new bill has been introduced containing 1,754 paragraphs. The preamble alone is a bulky volume of 784 pages. This bill has been referred to a Parliamentary Committee who have got through a little over 400 paragraphs; the discussion of which has been reported in the daily press. The final issue it is by no means easy to forecast.

One result of this new bill certainly is that it has awakened animosity and accentuated differences that have long existed between many of the medical men and those belonging to insurance societies. The main point in dispute is the "free choice" of doctors. In some towns and districts there has been absolute freedom on the part of those insured to call in whatever doctor they choose, so that apart from the mode of payment the relation of doctors to patients is that of private practice. In others, especially in the case of those attached to large factories, the choice has been limited. In April last 491 delegates, representing nearly 24,000 medical men, met in Berlin and all but unanimously—there were three dissentients—emphatically protested against the new bill and affirmed their ideal of free choice. What right, they ask, have sick offices to prescribe how many or what doctors should practise in a particular district? The working classes themselves have freedom of contract, why should medical

men be restricted? Why, as in many districts would doubtless be the case, should they have to trim their political opinions to suit a political party? It seems, however, evident that not a few of the societies wish to have the doctors under control. If there be absolute freedom of choice, they say that medical men will court popularity and give certificates, so that there will be no limit to malingering. Besides, if payment is made according to the attendance given, medical men will pile up bills so as to drain the insurance societies. As to malingering, the doctors admit that there are black sheep in every flock, but they say that when complaints are made they can readily be settled by a strong committee of medical men; while the fact that employers who contribute and have an interest in the amount paid ought to prove an additional safeguard. The question as to piling up unnecessary attendance when freedom of choice is given is not so easily solved. I do not think that it can be denied that during the first few years of State insurance there were medical men who took a dishonest disadvantage. A child might be brought to a surgery, and it might be elicited from the parents that there were three others at home suffering from the same disease. In this case a charge for four consultations was made. The claims sent in came as a surprise, and the future of State insurance was seriously threatened. Many measures were tried. I have beside me the annual reports for the past twenty-five years of the working of sick assurance in Leipzig, and it is most interesting to watch the development. The plan at last hit on was to fix a certain sum per head, and if the total demands for attendance exceeded the multiple of that amount, what is termed a liquidation was made, and a certain percentage was deducted from each bill. This system seems now to work satisfactorily. It would require a volume to enter into detail on the different matters involved in this dispute. It is being constantly referred to in the daily press, and discussed at great length in the medical journals. Already, as is generally known, it has led to a strike in Cologne. Meantime, the insurance societies in Cologne have conquered. They have brought in what are usually termed "blacklegs," and it is generally admitted that they are the dregs of the profession. The people seem to be losing confidence in them, and notwithstanding their efforts and the prying of officials, one does not find in the latest statistics any proof that they are succeeding in the prevention of malingering or lessening the claims for medical attendance. It is quite possible that this strike may extend over Germany. Both parties are confident in their position. The 24,000 members of the Leipzig Verband affirm that if their claims are not granted they will refuse medical attendance, and the societies will be compelled to yield and State insurance become impossible. Insurance officials, on the other hand, say they will stick to their position, and that though 24,000 men are banded together, there are still 12,000 on whom they can safely rely. Judging from the state of matters in Cologne, it does not appear that many of the 12,000 would show themselves inclined to back up the societies.

The wage limit has furnished another subject of dispute. Hitherto, as we have said, sick insurance has been limited to those having a yearly income of not more than 2,000 marks. It is now proposed to extend this limit to 2,500 or 3,000 marks. In the Parliamentary Committee a Social Democrat proposed 5,000 marks. In Austria it is proposed to raise the limit to 3,600 marks. Medical men contend—and they have supported their contention by elaborate statistics—that if the limit were raised even to 2,500 marks, it would mean the almost entire elimination of private practice in many districts; and they further contend that while the amount paid under State insurance by the average workman might be sufficient, they would seriously suffer if attendance were to be had on the same terms by well-paid artisans and the middle classes. Further, the new bill proposes to cover a class not hitherto reached by State insurance, namely, farm servants and those living on a few acres of ground. Were the limit in their case to be fixed at 2,000 marks, there are many rural districts in which there would be practically no field for private practice. A limit of 900 marks is regarded by many medical men as quite sufficient to meet the necessity of the case.

In reading the journals that deal mostly with this dispute, one is struck by the fact that comparatively little is said as to the actual rate of payment. As there is a general impression in England that German doctors are very badly paid, perhaps I may be pardoned for devoting a little more space to this subject. Two months ago our Government kindly gave me introductions to the Ambassador at Berlin and to the Consul-General at Hamburg, in order that I might have greater facilities for inquiring into State insurance. Through their great courtesy and kindness, for which I cannot be too thankful, I had a ready entrance into Government offices, discussed the subject with State and other officials, doctors, and heads of insurance societies. One thing I noted—that when the dispute between the doctors and the insurance societies was mentioned there was hardly any one who could discuss it dispassionately. For example, when the rate of payment was referred to, I was told by insurance officials that the doctors were extortioners; that they were plundering the poor; that in no other trade or profession was it possible for a man to make £500 or £750 within the first few years. On the other hand, the doctors say that it is scarcely possible to eke out an existence, and quite impossible to make adequate provision for wives and families. The truth seems to lie between the two extremes. In this country there is no means of precisely estimating the average income of medical men. In some parts of Germany it seems possible to make a more precise estimate, as statements have been published giving the amount on which income tax is paid. I have, for example, beside me the statistics from Schleswig-Holstein, a State in which there are practically no large towns, and where the inhabitants are mostly occupied in agriculture, navigation, and fishing. The following are the amounts on which income tax is paid by the 603 medical men in ordinary practice:

Under £200	28 per cent.
From £200 to £300	22 ,,
From £300 to £400	20 ,,
From £400 to £500	13 ,,
From £500 to £750	12 ,,
From £750 to £1,000	3 ,,
From £1,000 to £1,700	2 ,,
	and one over.

When we thus find that 70 per cent. have a net income of less than £400, we may probably take it that the average income in a similar district in England is somewhat higher. But in judging this matter we must take into account the fact that life in Germany is simpler, and that not so much is expected by patients in the way of expensive motor cars and other kinds of expenditure not absolutely necessary. And, further, we must note the steady increase of fees under State insurance. In Hamburg, for example, the amounts paid by each member of this municipal insurance society for medical attendance (medicine not included) in 1895 was 2s. 5d. In 1909 it was 7s. In all towns there has been a steady increase. That the financial position of medical men in Germany is better than is generally supposed is further evident from the fact that though there are good openings in commercial and scientific pursuits, the number of medical students during the past six years has almost doubled. (In the winter session 1904–5 there were 5,926; in 1909–10 there were 10,263.)

We have thus seen that though the financial position of medical men in Germany is not all that could be desired, it is better than it is often represented to be. The German system of State insurance is not perfect, nor do I know that a perfect system is possible. A modern writer has said that: "The modern Utopia must be not static but kinetic, must shape not as a permanent stage but as a hopeful stage leading to all manner of stages." Much depends on the individual. Better, perhaps, than a perfect system would be "a flexible common compromise in which a perpetually novel succession of individualities may converge most effectually upon a comprehensive onward development." Viewing the matter in this light, and putting aside details, there are certain general principles in State insurance for which I contend, and which, if wisely adapted, would, I believe, solve all our difficulties.

1. *Compulsion.*—We are constantly told that the great body of people in this country will not tolerate compulsion. Before rushing to that conclusion it would be more reasonable to consider what compulsion means. There are certain things which are better done by us as individuals. There are

others which are better done by the municipality or the State. It would be impossible for every family in London to provide their own water supply. In getting it otherwise we are compelled to submit to conditions. England has already travelled far in the way of compulsion. Education is compulsory, and though we may not all care to send our children to the Council schools, we are compelled to pay for the children not only of paupers but of those who may be earning thousands a year. Turn where we may we find compulsion. We may be attending the children of well-to-do people for some infectious disease and expecting a good bill. The sanitary inspector steps in. They are removed to an institution where they are maintained at great expense, and we are compelled to pay for them. We are compelled to notify births and certify deaths free of charge, and if general practitioners continue to be as apathetic as in the past, we shall soon be compelled to pay hospitals and midwives for doing work for which we were educated and which we are quite capable of doing. Medical men are compelled. But there must be no law to compel men earning good incomes to make provision or pay for medical attendance! They may talk loudly about independence, squander their money, sponge upon charity, and become a burden on their poor and provident neighbours, but they must not be compelled. If England is to hold its own among the nations, some regard must be had to the *moral* as well as the physique of its people. Happily there is one good sign of the times—namely, that one can hear the strongest language on this subject from the better working classes themselves.

Among those who object to compulsion are the authors of the Minority Report. They there tell us that in this country "Compulsion is totally impracticable." In what respect do we differ from other nations where it is found to be practicable? A strange statement this is to come from the authors of a report who themselves advocate a form of compulsion more drastic than any country has heard of. As a straw will sometimes show how the wind blows, I may be pardoned a simple illustration. Some years ago there was in my own neighbourhood a rapid increase of rates. The people protested, but there was no great excitement. Shortly after the council gave notice that all houses under a certain rental were to be inspected, if any part of them was sublet. The feeling was so strong that the council had to resile from their position, and promised that there would be no inspections unless some prima facie evidence of nuisance existed. So far as I read the signs of the times, the public, especially the working classes, will submit to a great deal in the form of deduction from wages or payment of rates, but they will not submit to such a form of compulsion as will allow lady health visitors and others to enter their houses and compel them to submit to medical treatment. We may strain at a gnat, but we need not try to swallow a camel.

2. Another main principle of State insurance is that, in order to adequate medical attendance being given, assistance is required from the employer and the State. As already said, the Poor Law Commission have laid much stress on the fact that there is a large body of people in this country, not paupers, who cannot pay for medical attendance. And here I entirely agree with the authors of the Minority Report when they persistently ask, Why should a man be compelled to become a pauper because he is sick?

It is needless to dwell on the fact that it is the duty of the State to secure for all the best possible measure of health. The State has already recognized its obligations in that respect, and has expended large sums on public health. Board, lodging, and medical attendance are provided free of charge, not only for the poor, but the rich when they are suffering from infectious disease. There has been but little limit to expenditure in that direction. Is it due to the remissness of general practitioners that hitherto, apart from the Poor Law, the State has done nothing in the way of providing medical attendance for the hundreds of thousands who suffer from non-infectious disease and who cannot afford to call in a doctor?

It might seem at first sight more difficult to explain why the employer should contribute to the cost of medical attendance on his workers. And yet, if we are not blinded by custom and totally absorbed in our insular ideas, the reason seems plain. In feudal times—it might be from pure selfishness—the landowner took on himself the responsibility for the health of those on his estate. In those parts of the country where remnants of the patriarchal system still remain the master provides for the health of his servants and the employer for that of his workers. Many of us can look back to our early days in practice when, if a man was injured at work or took suddenly ill, the bill was paid by the employer. He is now taken to the nearest hospital, where he is treated at the expense of the charitable public, and if any considerable contribution is made by the employer he is applauded for his liberality, but he in no way recognizes any obligation. This is not as it should be, and the better class of employers fully recognize the facts. There is a spirit of great liberality among many employers, and they aim at something higher than popular applause or titular distinction through giving large sums to charities. They know that money given as at present is often misspent. They have a genuine interest in their workers. They are desirous of a closer relationship than the mere cash nexus, and not a few of them would, I believe, gladly give more if they could but see the money wisely expended. To those who are not acquainted with the discussion on the new German bill it may come as a surprise that the employers are desirous of paying more rather than less. It will be remembered that, according to the law as at present, the employer contributes one-third and the worker two-thirds to the sick insurance fund. The employer now wishes to pay one-half, the reason being that he desires an equal share in the management. From this it is evident that there is no strong objection on the part of employers in Germany at least to contribute towards medical attendance on their workers.

There are two considerations that appeal to employers in this country. First, they reckon that if money were paid in this way there would be less to pay as a poor-rate. It would be too tedious to go into statistics, but I think we may take it that State insurance has reduced the poor-rates in Germany by at least one-half. I have made a rough comparison between what some firms in this country are paying as poor-rate and what they would have to pay if State insurance were introduced, and reckon that they would have to pay considerably more, but that there are compensating advantages. Another consideration that appeals to employers is the fact that now that the Poor Law Commission has sat they are likely to be called on to pay more in any case, more especially if the recommendations of the Minority are adopted. If, as under that scheme, payment of trifling sums for medical attendance are to be recovered, it seems doubtful if the amount received would do more than cover the cost of collection. We can learn from the past. Some of us can well remember what happened when education was made compulsory. There were many parents who could not pay the fees. School boards became heartily tired of remitting fees, and few attempts were made to recover. The consequence was that the House of Commons, with, if I mistake not, five dissentient votes, peremptorily settled the whole business, and made education free to the children of rich and poor alike. If the recommendations of the Minority were carried out, we need scarce doubt that the result would be the same as regards medical attendance, and the burden of rates and taxes vastly increased.

While claiming that the employer should contribute towards attendance on his workers, there is, however, one respect in which, I think, he already pays more than his due. It will be remembered that in Germany the cost of insurance against accident does not come into force until after thirteen weeks, so that up to that time the burden does not, as in this country, fall entirely on the employer. As accidents are quite as often due to the carelessness of the worker as to defects in machinery, there seems to be no reason why the worker should not contribute his share. Were this done, the employer would be placed on a more equable footing, and it is probable the number of accidents would be largely diminished.

3. Were State insurance introduced in this country, there is one principle for which our German *confrères* have strenuously contended, and for which we too, I think, should strenuously contend—namely, the independence of the medical profession.

We are here beset with danger from two different quarters. If the proposals of the Minority Report are

carried out, we become the servants of county and borough councils. Much has been said against guardians. With a few exceptions, I do not think they can be accused of having unduly interfered with their medical officers. Part-time medical officers of health have not had all the freedom that could be desired, and when we see after every municipal election the scramble of jerry-builders and owners of small property to get on health committees, we naturally surmise that the position even of the whole-time medical officer, if he do his duty, is not always an enviable one. Hitherto the great body of the profession has been free from outside control, but were practically all to become subject to municipal authority, the position of those holding appointments would be less comfortable than it now is. Great attractions in the form of large salaries and motor cars have been held out to us as the price of our freedom. Many of us who are general practitioners are too old to depart from the traditions of the past, and it would be a great hardship were we obliged to seek appointments or promotion through public bodies. Like our German *confrères*, we are equally anxious that our profession should not be lowered by political or other wire-pulling becoming a condition of appointments or promotion rather than ability and capacity to practise our profession.

Further, were a State insurance bill passed, the danger is that we might become, even more than we now are, the servants of clubs and friendly societies. Under State insurance, as we have seen, the freedom of medical men may be as great as in private practice. This has always existed in some parts of Germany. In others it has not, and now there is the determination to fight for it. I shall not refer to the differences that have arisen in Germany as to the amount of fees, and as to whether payment should be according to a fixed sum per head or to the amount of attendance. These difficulties can be got over; but if the voluntary societies in this country are to insist that any man, whatever his income, may become a member and be entitled to medical attendance, I cannot see how a reconciliation is possible. In no other country has a similar demand been made. The German societies have always admitted a limit beyond which members shall not be admitted. The contention has only been as to the amount at what that limit shall be fixed. How this difficulty is to be got over I know not. As there is at present a committee consisting of members of the British Medical Association and the representatives of friendly societies, it may not be advisable to say much on this subject. Possibly, however, I may be allowed to make a suggestion. As these societies exist for trade purposes and the support of their members during sickness, is it, in consideration of the present position, absolutely necessary that they provide medical attendance? The Hearts of Oak Society, for example, seems prosperous enough, and it does not regard this as a necessity. Be that as it may, we must hold our own, and support our members if they plainly say on what conditions they are willing to hold their appointments. Trades-unionism is foreign to the spirit of our profession, and it is sincerely to be hoped that these differences will be settled, and that, like our German neighbours, we shall not be compelled to take up an absolutely antagonistic position, and decline to continue attendance unless under reasonable conditions. In any case, I hold that all advantages that might accrue through State insurance or otherwise would be dearly bought if the medical profession in this country were to lose its independence.

4. State insurance has for its object not only the treatment but the prevention of disease. For the prevention of disease it is essential that there be no difficulty in obtaining treatment. As every member of a State insurance society is entitled to attendance and medicine free of charge, there is no temptation to delay till a disease has passed its earliest stage. Nor is there, as in this country, any difficulty or delay in entering the hospital, sanatorium, or convalescent home. In the annual report just published of the Leipzig Municipal Sick Insurance Society, one finds numerous illustrations, constituting quite a work of art, of the institutions provided by the society and private individuals.

At the same time be it noted that, apart from infectious disease, there is no compulsion to undergo treatment. For this it is reckoned there are other safeguards which are quite sufficient. It is, for example, the interest of the employer, who has to bear his share of the cost of the maintenance and treatment of his workers during illness, to see to it that they are not injuring their health nor unduly delaying to seek adequate treatment. The advent of disease makes itself known to the individual himself, to his friends and neighbours, and whatever precautions are taken it is probably but seldom that its presence is discovered otherwise. Some of the German officials I met were well acquainted with the proposals put forward in the Minority Report and regarded them as ludicrous. Are you, I was asked, to send your young lady health visitors to interview big navvies, to diagnose their ailments, and to compel them to submit to treatment? Others, to whom I explained our present position, regarded these proposals as too absurd to be credible.

I do not think it can possibly be denied that in recent years a great advance has been made in the prevention of disease and in sanitation in the large towns in Germany, though progress has been but slow in many country villages. State insurance, working hand-in-hand with the public health system, has been making a determined fight against tuberculosis. A vigorous campaign is now being initiated against alcoholism and sexual disease. It is quite true that one seldom sees a man what is termed the worse of drink in Germany. At the same time it is becoming more fully recognized that the drinking of enormous quantities of light beer and coarse spirits are undermining the physique of the nation. They further claim that their mode of dealing with the prevention of disease is more practical than in England. Why, I was asked, have the English people been spending millions of pounds in an endeavour to stamp out scarlet fever, when they might have seen long ago that the measures they have adopted were utterly unpractical?

Quite recently I spent the greater part of two days in wandering through the poorest parts of Berlin and in conversing with all manner of people. I saw poverty enough, as was evidenced by the clothing and impaired physique, but I failed to discover one man, woman, or child unwashed or with unmended garments. Rightly or wrongly, I could not help attributing this in no small degree to their system of public health and to the self-respect engendered by the contributory system. In Hamburg, with its large foreign population, I found two districts that approximated to the slums in our English cities. But there, too, rapid progress is being made. Property is being bought up, houses are being pulled down, and it seems not improbable that in a few years the narrow and crowded streets will have entirely vanished.

Since writing this paper I have received a long list of questions from several medical men. Some of these I am unable to answer, as I have neither had the leisure nor the opportunity to become as fully acquainted with the subject as I could wish. The difficulty lies in the fact that there is a great difference as to details in different districts. Fees, for example, and many other matters are arranged locally between the medical men and insurance offices, and when disputes arise there are different authorities to which they can be referred. It would be impossible to state precisely the average amount paid where there is a fixed sum for each individual. I have gone through the reports of several towns, but know that I am quite open to correction when I set down the average as a little over 6s. for each member. This, it will be understood, does not include medicine, medicine being supplied, unless in remote country districts, by chemists, who contract for a fixed sum, and are paid in the same way as medical men. Chemists do not prescribe even for trivial ailments. In Leipzig the fee for the first visit is 2s., and 1s. afterwards, extra fees being paid when the distance is more than three-fifths of a mile, for night visits, confinements, operations, etc. It has not always been found possible to make arrangements for families. On the list of insurance doctors there are general practitioners and specialists, and in large towns there are central clinics where there are a number of doctors, and there is no weary waiting till patients are seen.

The subject has been much discussed by the Committee who are sitting on the new bill, but it has not yet been found possible to include casual labour. A leading Government official told me that this is not a matter of so much interest to them as to us, as he did not believe that in all Germany there are 100,000 casual labourers. Happily this problem seems in the way of being partially solved in

this country, as many employers are now seeing its disadvantages and endeavouring to secure regular instead of casual labour.

A further question has been asked—How would State insurance affect the different grades of the profession? So far as I can see it, the Poor Law medical officer would continue to hold his present office, but the amount of work would be considerably curtailed. Part-time and whole-time medical officers of health are required. The Polizei-Arzt—whom we must not regard as the police-surgeon, but rather as somewhat equivalent to our part-time medical officer of health—is much in evidence in Germany. Were a movement to take place here for "free choice," as in Germany, club and works' appointments might be gradually thrown open, and those holding these appointments might lose some of their patients, but the loss would be compensated through a higher fee being paid owing to the contribution from the State and the employer. At the initiation of State insurance this difficulty was got over more easily than was anticipated, and among the 24,000 medical men banded together for free choice are many who are holding appointments. Were State insurance to be made universal in this country, practitioners living in districts where the working classes pay good fees might find themselves worse off financially, but there seems to be no reason why matters of detail should not be left to be settled according to the needs of this community. In large towns and districts where the working classes pay little or nothing, as every worker would be compelled to pay, the income of the general practitioner would be largely increased. The amount paid under State insurance has not, so far as I can make out, influenced the rate of payment by the middle and wealthier classes. As a line of demarcation has thereby been drawn, and as one can readily know who are entitled to low fees and to charity, we might reasonably anticipate that the field for consultants and private practice would be greatly enlarged, but, as Sir Arthur Downes has said, "The future must largely depend on the action of the great voluntary hospitals and institutions of charity and self-help."

I shall conclude by quoting the words used by the opening speaker at the recent congress in Berlin, though I cannot give the full force of the original:

> Let all our deliberations be inspired by a sense of the seriousness of the position, inspired by the love of our calling and profession, inspired by the necessity of a faithful and strong combination, but also inspired by the love of our country, for it is our firm conviction that compliance with our wishes and demands would benefit not only ourselves but the nation at large.

Whatever benefits State insurance would confer on the medical profession, I am strongly convinced that it would still more benefit our country by encouraging a higher tone of morality, by mitigating the lot of the poor, by promoting independence and patriotism, and by enabling us to hold our own among the nations. It is in this, I think, and in no narrow-minded or selfish spirit, we ought to appeal to our country and our Government if we expect them to comply with our demands.

STATE INVALIDITY AND SICK INSURANCE.

CONSIDERATION OF THE TERMS AND CONDITIONS ON WHICH THE NECESSARY SERVICES OF THE MEDICAL PROFESSION SHOULD BE OBTAINABLE.

By E. ROWLAND FOTHERGILL, M.B., B.S.,
WANDSWORTH.

The physical deterioration resulting from unemployment, insufficient or bad food and housing, neglected ailments, etc., with all the consequent injury to succeeding generations, has for some time been brought prominently before the medical profession.

All parties in the State now recognize their existence and their urgency, and are in favour of taking some steps to try to stop this human wastage.

The Problem.

The problem would seem to be how to maintain the 15,000,000 of the labouring classes in the most perfect physical conditions so that they may one and all retain their positions in the "fighting line"; how to return to this fighting line with the least possible delay those who are laid by temporarily through illness or accident; and how to prevent those who through age, illness, or accident have had temporarily or permanently to leave this fighting line from becoming a source of danger to the health of others.

That portion of this problem which more nearly interests the medical profession has been labelled "invalidity."

Charity.

As it is the Government which intends to bring forward proposals to deal with this problem, which to be complete should include recommendations covering medical attendance, any further necessity for appealing to the medical profession in the name of charity is gone. The profession, however, should be on its guard that any difficulties that may for the moment arise in the elaboration of a scheme are not solved to the satisfaction of the laity by some such appeal. Each party interested in the scheme—whether the State, friendly societies, trade unions, employers, or the medical profession—can quite well be left to do its own charity in its own way, and not as a consequence of coercion.

Insurance Company.

The scheme should be worked on an insurance basis. Who is to be the insurance company?

As the State with its limitless possibilities of calls will be fully able to guarantee the funds necessary for an efficient and constantly improving service, and as it must control the distribution of the funds in order to safeguard the interests of the taxpayers and the beneficiaries, it alone would seem to be the party to take this position of responsibility.

The State, therefore, would guarantee:—

(1) To the beneficiaries:

- (*a*) Medical attendance during accident and illness.
- (*b*) Sick pay during accident and illness.
- (*c*) Pensions when permanently out of work through illness before being 70 years of age.
- (*d*) Sustenance and medical attendance for the families of those laid by.
- (*e*) Adequate wages during unemployment due to no cause over which the beneficiary had a control, or which is a result of physical defects.

(2) To trade unions, friendly societies, State hospitals and dispensaries (clinics), nursing and convalescent homes, nursing associations, and all branches of the medical profession adequate funds wherewith to meet the claims on their respective services.

Determination of Funds Required.

The trade unions and friendly societies will no doubt be consulted, if this has not already been done, with reference to (*b*), (*c*), (*d*) and (*e*).

The medical profession should be consulted—and through the only body representative of it (the British Medical Association)—with reference to (*a*) and (*d*).

The Government having obtained the necessary data from all parties, can then with actuarial advice determine the total amount of funds required to carry any suggested scheme into operation, and also apportion the amounts of the contributions to be asked from the State, the employers, and the employees.

The Question for the Medical Profession.

The Chancellor of the Exchequer has expressed his willingness to receive a deputation from the Association to discuss the proposals of the Government in so far as they may relate to the medical profession.

It would therefore seem opportune to consider what reply the Association will give to the question, "On what terms and on what conditions does the Association suggest that the necessary services of general practitioners, consultants, and specialists should be placed at the disposal of the State?"

The Terms of the Contract.

If the medical profession decides that it is desirable in the interests of the community, as well as of itself, that there be some scheme of invalidity insurance covering

Table giving Some of the Advantages and Disadvantages stated to attach to the Three Proposed Terms of Contract.

	(1) Payment per Head per Annum.	(2) Whole-time Appointments.	(3) Payment for Services Actually Rendered.	Comments.
What would be the position of the doctor in an epidemic?	The Government would exact the extra services required in fulfilment of the bond	The Government would exact, without any increase of remuneration, the extra services required in fulfilment of the bond	The Government would pay the doctors for the extra services required	The doctor becomes the insurance company in proposals (1) and (2).
What would be the position of the doctor when the Government desired additional duties?	As in the Post Office appointments, these duties would be imposed with no increase of capitation grant	There would be no increase of salary	The Government would pay the doctors in accordance with terms arranged with the British Medical Association	Ditto.
Could the State rest satisfied that the proposal would tend to prevention of disease?	No. As a consequence of the application to the doctor on the most trivial excuse the doctor has come to treat most of such patients by "a bottle of medicine" after lightning diagnosis	As in proposal (1), the benefit will be *nil*	As the doctor will obtain a fee he will be encouraged to devote time to the patient	In any case, the best way for attaining the object in view would seem to be by compulsory visiting at stated periods for a guaranteed fee of the patient by the doctor.
Would not the Government wish every medical requirement covered by the insurance?	Yes. But as no one doctor is qualified to give every attention there are bound to be extras	No doubt there would be whole-time officers from all branches of the profession	As payment is by fee the necessary treatment can be obtained of the competent doctor	No scheme with loopholes would appeal to the State.
Could it be said that by this scheme a doctor had underwritten the State's insurance policy?	Yes	No	No	Doctors are tired of being insurance companies, with no capital to draw on except their own health and the interests of those dependent on them.
Can it be said that the patient has an absolutely free choice of a doctor?	No; for the two are tied together for a year, whether one or both desire to cancel the agreement	No; the State would bind the beneficiary to a certain doctor	Yes. Both are at liberty to cancel at any time the arrangements made	Those who at present have full liberty of choice and will be compelled to insure will not favour proposals (1) or (2).
Would patients complain of neglect and that a doctor was not doing his best?	They do so now, and in lengthened illnesses doctors transfer them to hospitals in order to save their time and drugs	As in proposal (1), the same position would arise	Seeing that doctors are paid by fees, the justification for such an assertion would be questionable	If the State desires prompt recovery of a beneficiary proposal (1) would defeat that object.
Is the proposal likely to encourage farming out the patients by a doctor to newly-qualified and underpaid assistants?	It would be impossible for a doctor to do the work otherwise, there being no check on the demand for his services	Not possible	Being paid by fees, if the doctor could not attend he would be in a financial position to engage at a good salary a thoroughly capable assistant	The State is hardly likely to organize any service allowing of this abuse.
Will a doctor be able to know his income under the proposal?	Yes. For example, he will know he will get £400, and no more, however much he does	Yes, as proposal (1)	Yes, seeing that in private practice doctors can roughly estimate their probable receipts. He will know he will get £400 for the work done under proposal (1), and most certainly a good deal more on an average of years	—
Does the proposal relieve the doctor from being the slave of his patients?	No. He is tied for a year, having once agreed to have the patient on his list	No	Yes. At a moment's notice the doctor can, as in private practice, decline attendance	Although proposal (1) gives a beneficiary a choice of all doctors in the district, it only increases the number of possible slaves.
Will doctors have cause to complain of vexatious calls made on their services?	Yes; as at present	Yes	No	The State as well as the employers, as they help to pay the doctor, will associate themselves with the employee as taskmasters, and compel acquiescence. A doctor might be ruined by this pressure.
Would there be any security for the doctor being paid for extras not covered by the capitation fee?	None whatever; and he would be compelled to go on attending until termination of his year's agreement, when the patient would transfer himself to another doctor, and never pay his debt	There would be no extras	Each item would be guaranteed payment in accordance with tariff of fees	—
If a doctor succeeds to a practice would it have influenced his decision to have known ages and state of health of beneficiaries on his predecessor's list?	Yes. The older the beneficiaries are, the more attendance they require. He would give the attendance for which his predecessor had received and retained the payment	No	No. He would know that the more attendance the more payment to himself	—
If a beneficiary develops a chronic illness, what would probably happen?	At the termination of the year's contract, no doctor would accept him at the capitation fee, the risks being unknown	Nothing. Only more work for the whole-time officer	Extra fees would be received by the doctor	The State would not approve any scheme which threw out of it invalids and the aged.
Does the proposal offer the doctor any inducement to transfer his present club patients into the scheme?	No; for be would saddle himself with two additional taskmasters (the State and the employer), even if he did receive a higher premium	No. As in proposal (1)	Yes. He would obtain payment for work done and be independent of officials	Under proposal (1) a doctor might receive £100 for attending 500; under proposal (3) he would retain, say, 400 members, and receive more than £100.
Seeing that the probability is that all earning under £160 may be in the scheme, does the proposal benefit or harm the doctor who at present gets paid by account?	Great harm would result in greatly lowered income	As proposal (1)	No harm would result providing fees in tariff were on a satisfactory scale	The probability is that in districts where there is no club practice, if proposal (1) is enforced, that the beneficiaries will contract out, and the scheme be a dead letter.

medical attendance,* then there would seem to be four possible replies as to the terms:

(1) By a fixed payment per beneficiary per annum, throughout the United Kingdom.

(2) By whole-time appointments with security of tenure and participation in a superannuation scheme, throughout the United Kingdom.

(3) By payment in direct accordance with services rendered; such payments and services being determined in a tariff covering all possible contingencies, and which has been agreed upon between the Government and the Association, such tariff to be applicable throughout the United Kingdom.

(4) That the United Kingdom be divided into zones. That proposal (1) or (3) be made applicable in a zone as might be determined by the local Board of Control after consulting the local medical profession.

Funds for the Medical Service.

It cannot be too early recognized that, although the Government will no doubt be willing to give the Association adequate representation on all central and local Boards of Control formed of parties interested to deal with the whole scheme, there can be no possible chance, in these days of representation going with taxation, of that portion of the funds necessary to cover the medical service (several millions a year) being handed over to the Association for it to distribute.

The organization of the Association centrally and locally will probably be found useful by the State for the ethical control of its members, and for voicing the wishes of the medical profession.

Axioms to be Used in Testing the Advantages and Disadvantages of the Terms.

Before enumerating some of the advantages and disadvantages stated to attach to each one of the suggested terms of the contract, it might be useful to repeat certain axioms by which to test these terms.

(*a*) The true interests of the community and those of the medical profession invariably coincide. Any scheme suggested for providing medical assistance which does not recognize this fact will prove ultimately to be unsound.

(*b*) Any system of medical assistance to prove satisfactory should ensure that the payment to the medical man should be adequate, and in accordance with the professional services required.

(*c*) Under any scheme of insurance against the cost of medical attendance it should be possible to place the insured in a similar position in all respects to that held by a person whose financial state renders an insurance unnecessary.

The Advantages and Disadvantages stated to Attach to Each Proposal.

As no correspondents have placed before the members in the JOURNAL arguments in favour of whole-time appointments, or fixed payments per head per annum, it is necessary to refer to those advanced at the recent Representative Meeting, although even there the recommendations in favour of the latter proposal were such as might be expected to be advanced by a beneficiary, and not a medical attendant.

For clearness of demonstration the three proposals, with a few advantages and disadvantages said to attach to them, have been placed in a tabular form (see p. 749).

As in no insurance business is it allowed to the beneficiary, on his own unsupported testimony, to demand the benefits for which he has insured, those in favour of proposal (1) would seem to have to provide some safeguard in order to obtain general acceptance of their recommendation. Another safeguard which it would seem to be necessary to provide is a maximum limit to the amount of benefit which can be obtained in return for the amount of premium paid. On the other hand, those in favour of proposal (3) would have to provide some safeguard against collusion between the beneficiary and the medical attendant with the object of making the account for the latter as high as possible. In Germany this seems to be done through the ethical control exercised by the medical association.

The advantages and disadvantages tabulated on p. 749 do not exhaust the number that it is said can be enumerated, but they will suggest others to those who are conversant with practice of a contract nature, as well as afford an opportunity to any who favour one system to advance arguments for or against the statements made.

Two arguments have been advanced in favour of proposal (1)—namely, that medical men are used to this system and would not readily understand any other; and, again, that there does not seem to be any great disposition on the part of doctors, although constantly protesting, to give up that form of contract. The former argument has been advanced in favour of skinning eels alive, and the latter might be advanced in the form that it is quite unnecessary to provide a man overboard with a lifeboat seeing that he is clinging so tenaciously to a spar of timber.

The Conditions of the Contract.

It is not possible to enunciate conditions before we hear the intentions of the Government. But these three might probably prove acceptable to the medical profession:

(*a*) That in all negotiations with the members of the medical profession the British Medical Association, its Branches and Divisions, shall be the recognized medium.

(*b*) That the medical profession, while always desirous to co-operate in schemes having for their object the physical improvement of the nation, declines to relieve the Government, the employers, or employees of their respective liabilities to each other in any scheme of insurance propounded.

(*c*) That the medical profession, while willing to negotiate for its services, refuses to make itself responsible for the provision of clerical assistance, drugs, and other requirements for a complete medical service.

Scheme of Invalidity and Sickness Insurance.

Should the Government decide to put forward a scheme to include medical services, the British Medical Association would no doubt be willing to assist in the drafting of the medical portion of it, if asked. But it might place the Association in an awkward position were it to allow schemes covering the various requirements to be published under its aegis before the intentions of the Government are known.

As insurance against unemployment in many of its aspects is closely allied to this question, the recent presidential address given by Sir A. Llewellyn Smith in the Economic and Statistic Section of the British Association at Sheffield, which is quoted fairly fully in the *Daily Telegraph* for September 2nd, might be read with advantage.

It is to be hoped that members of the medical profession, especially general practitioners, will without any further delay address themselves to the reply to be given to the question: "On what terms and on what conditions does the medical profession suggest that its necessary services should be placed at the disposal of the State in any scheme the Government may bring forward to cover invalidity and sick insurance?"

* The medical profession in Belgium has decided against it, and has formed a "Cercle Médical." See BRITISH MEDICAL JOURNAL, September 3rd, p. 630.

UNDER the will of the late Mr. Daniel James Woodman, of Blackheath, Guy's Hospital receives a donation of £1,000 for the endowment of a Woodman Bed, the National Trust Society £600 for general purposes, the Seamen's Hospital, Greenwich, and the Royal Hospital for Incurables, Putney, each £500, and the Cancer Hospital, Fulham, £300.

WE are informed that among those to whom a Grand Prix has been awarded by the judges at the Japan-British Exhibition is the firm which manufactures the well-known disinfectant Izal. A good many members of the Association were, we believe, the guests of the firm at its works near Sheffield, on the occasion of the annual meeting a couple of years ago.

THE Government of Bombay has decided, we learn, to extend the area over which the existing Leper Act applies in the Province, and in co-operation with the Mission to Lepers in India and the East to provide whatever additional accommodation for lepers may prove necessary. The Mission, which only receives a small subsidy, already supports nearly 4,000 lepers in India, and is now engaged in improving its arrangements for those of pure European and Eurasian extraction. Gifts in aid of this enterprise will be gladly received by the Organizing Secretary, 33, Henrietta Street, Covent Garden.

SEVENTY-EIGHTH ANNUAL MEETING

OF THE

British Medical Association.

Held in London on July 22nd, 23rd, 25th, 26th, 27th, 28th, and 29th.

PROCEEDINGS OF SECTIONS.

SECTION OF ANAESTHETICS.

FREDERIC WILLIAM HEWITT, M.D., M.V.O., President.

PRESIDENT'S INTRODUCTORY REMARKS.

THE President, after a few initial observations, said that the inauguration of an Anaesthetics Section had come about at an opportune time, for, owing to recent developments in this branch of practice, they were, he believed, on the threshold of a new era in anaesthesia. The characteristics of this new era might be summed up in the two words—precaution and precision. They were, he hoped, about to bid farewell for ever to slapdash and slipshod anaesthesia, and to the dangerous view that, no matter how skilful the administrator of an anaesthetic might be, the use of that anaesthetic was necessarily attended by a certain definite risk to life. The era that fortunately was closing had allowed this misleading view to pass unchallenged. The era that was opening would, he believed, witness the acceptance of the all-important principle that by the adoption of proper precautions—particularly as to the selection of appropriate anaesthetics—and by the application of precise methods of administering them, safe and efficient anaesthesia might be induced in practically every case requiring surgical aid. It was satisfactory to observe that considerable attention had recently been paid to this department of medical science. There was every reason to believe that by the better education of medical students, by an increase in the number of resident and other anaesthetic appointments, by the systematic and more careful examination of patients prior to anaesthetization, and by entrusting the administration of anaesthetics not necessarily to specialists but to those who had had ample hospital experience in their use, the death-rate of anaesthesia would rapidly decline. But in order that true progress might take place a great deal of work had yet to be accomplished, and this newly-formed Section of Anaesthetics would have no small opportunities in this and subsequent years of promoting the interests of the public by placing surgical anaesthesia upon that sound and scientific basis to which it was entitled. It was almost inconceivable that both the public and the profession had taken so little trouble in the past to provide for the safety of patients artificially rendered unconscious for necessary and beneficent surgical operations. Was there any medical function which more immediately and more profoundly interfered with the very mechanisms upon which human life depended than the administration of a general anaesthetic for a surgical operation? It was to be regretted that there were still certain people who displayed feelings akin to jealousy when any attempts were made to raise the standard of anaesthesia to its proper level. But he (the President) was convinced that all thoughtful and well-informed men must see the necessity for improving this department of practice in order to fit it for modern surgical requirements. So far as the meetings of this Section were concerned, he (the President) conceived that their main object would be the advancement of surgical anaesthesia by the interchange of observations, opinions, and theories. Such meetings as were about to take place were less suited, perhaps, for lengthy disquisitions and formal papers than for brief communications of an interesting and practical character.

In arranging the programme with the co-operation of the other officers of the Section, an attempt had been made to attack, in order of their importance, the various problems that had to be solved. Thus he hoped that a good deal of light was about to be thrown upon the vexed question of the best methods of chloroform administration; that some useful pronouncements would be made as to the advantages and disadvantages of the "open" system of etherization; that valuable contributions to the important subject of surgical shock would be made; and that the debate on the present position and limitations of spinal analgesia would leave behind it many useful conclusions. Finally, he would remind his audience that an opportunity would be given them of supporting the proposals for legislation that had recently been made by the General Medical Council and by the Home Office Coroners' Committee respectively—proposals which had as their object the restriction of the employment of anaesthetics for medical and surgical purposes to qualified medical and dental practitioners. He sincerely hoped that all members of the Association would take this opportunity of expressing the urgent necessity for protecting the public against the indiscriminate use of drugs which, thanks to the action of the Council of the Association, were considered, at all events by that body, as worthy of study by a special Section of the meeting. To those who were specially interested in this question of legislation it might seem a happy omen that almost on the eve of this inaugural meeting of this Section, the Home Secretary had stated, in reply to a question in Parliament, that when time permitted he hoped to propose legislation with regard to those recommendations of the Coroners' Committee relating to deaths under anaesthetics.

DISCUSSION ON THE DOSIMETRIC METHOD OF ADMINISTERING CHLOROFORM.

OPENING PAPERS.

I.—DUDLEY W. BUXTON, M.D., B.S., M.R.C.P.

BEFORE formally opening the discussion on dosimetry I should like to suggest what I am sure all members of the Association will heartily concur in, that we offer to the Association and its Council our thanks for the public-spirited manner in which they have helped by supplying money for the investigation of the action of anaesthetics.

To Dr. Waller we also owe a debt, for it was his insistence and his help which initiated the present inquiry and his guidance which assisted us in the early stages of our work. Mr. Vernon Harcourt also has done much, more than those outside the committee can know, to forward our research, and his has been a labour of love and one which can hardly be too lavishly acknowledged.

It will be convenient to give succinctly the substance of the final report of the Committee appointed by the British Medical Association. The work was restricted by the terms of the reference to the following lines of inquiry:

(*a*) The investigation of the best methods whereby chloroform could be quantitatively estimated in air, in the liquids and tissues of the body; and

(*b*) The determination of the exact percentage of chloroform vapour in air which would induce surgical anaesthesia without subjecting the patient to any risks of overdosage.

The ability to obtain accurate quantitative estimation of chloroform is essential before undertaking experiments to determine the percentage strengths of the vapour of chloroform inhaled and exhaled as well as the amount of chloroform retained by the fluids and tissues of the body. The Committee adopted certain methods, namely, that of Harcourt and that of Waller; but in a discussion dealing with the practical side of the question of dosimetry these do not require further mention.

The investigation of the maximum percentage which is consistent with safety emphasizes the following facts:

A safe percentage must have a sliding value, because a maximum value which is proved safe when it is gradually attained to—that is, when lower percentages lead up to it—is dangerous if employed *ab initio*. Again, a maximum percentage safe within the limits of the induction period is no longer within the safety zone when it is inhaled for a prolonged period.

Admitting these as facts, the safe percentage maximum, to which reference is made below, is that percentage which experiment and experience led the Committee to adopt as the limit for induction for adults. Below this percentage strength satisfactory surgical anaesthesia could not be attained within a reasonable time; percentage strengths above it affect respiration injuriously, and depress blood pressure to a dangerous degree.

The practical questions before us, then, are: (1) Can there be such a definite and uniform percentage strength of chloroform vapour in the inspired air during the ordinary administration of chloroform? (2) What method or methods exist to ensure the constancy of such a chloroform in air admixture, and how are they to be employed?

Capricious Action of Chloroform.

If, as it has been asserted, chloroform is a capricious drug no definite dose can exist, and each person submitted to it must take his chance of death or anaesthesia, according as the strength of vapour presented to him exceeds or falls below his personal maximum of safety. There is, however, no scientific evidence of the existence of this capricious behaviour of chloroform. There is some variation, within limits, of the reaction of individuals towards chloroform—a variation which some persons of experience have regarded and do regard as amounting to idiosyncrasy. It is considered that a percentage of, say, 2, for example, produces a more rapid anaesthesia in some persons than others, and this same percentage may fail to produce anaesthesia for quite a considerable time in some persons. But even if we were to assume the statement to be true that chloroform is capricious and certain individuals possess an idiosyncrasy towards chloroform, such facts would supply a very strong argument in favour of adopting a most precise and accurate method of dosimetric administration of chloroform, since such a method ensures that the patient passes into unconsciousness with only a gradual increase of vapour strength of chloroform, so that the signs of anaesthesia, which are too precise to be overlooked, supply the warning that for the particular individual the maximum limit of safety has been attained. Physiology has shown in the fullest way that chloroform when inhaled causes consecutive phenomena; the degrees of narcosis are absolutely uniform and progressive. It is true that an apparent difference in the phenomena is revealed under different conditions. A very high percentage vapour will cause sudden death—the death of the shot through the heart type—whereas a lower but still dangerous strength will kill gradually. The degrees of narcosis in the first case are telescoped together; the catastrophe conceals the individual steps through which it has been reached.

It is of the utmost importance that we should know whether there is a definite danger limit for all persons, and whether it is individual or uniform. To this point the Committee has devoted great attention. As far as we know, all drugs possess definite actions upon mankind: they stimulate function, or they destroy tissue life, and do so in direct proportion to the dosage employed. It was reasonable, therefore, to believe chloroform would obey the same laws. The earlier experimenters—Claude Bernard, Snow, Paul Bert—investigated the question by experiments upon the lower animals, and their conclusions are quite definite and precise. Also they agree practically in the figures which represent the percentages of chloroform in air causing anaesthesia or death.

A percentage below 1 does not produce surgical anaesthesia.
A percentage of 2 does produce anaesthesia.
Percentages above 1.7, if persisted in, gradually interfere with respiration, and a percentage higher than 2 more rapidly induces respiratory failure. Very high percentages produce sudden and complete respiratory failure and circulatory collapse.

It is difficult to understand how such very definite pronouncements failed to influence the methods adopted for giving chloroform, and it is hardly necessary to spend time upon this deplorable fact; this is rendered more extraordinary when we remember that even from the first the death-rate due to chloroform administration mounted year by year as the drug became the common property of the profession. If certain areas appeared immune from such catastrophes, investigation revealed the sinister fact that apparent safety was due to the absence of that wholesome publicity which has shown us the dangers not so much of the drug as of the methods adopted in its use.

Some attempts were made, however, to carry into practice the teaching of physiology. Snow, Clover, Dubois, Junker, and others devised dosimetric inhalers. Of these, the only safe one was that of Dubois, since Dr. Dubois alone adopted a safe maximum, namely, 2 per cent., while in the case of the other inhalers a possible 5 per cent. of chloroform vapour or more could be inhaled; hence the patient's safety depended entirely upon the skill and powers of observation of the person manipulating the inhaler. As a result, the Dubois machine alone has a record which is, so far as I can ascertain, without a single death. Snow's, Clover's, Junker's inhalers, although possibly safer than some plans, still allowed death through overdosage, even in the hands of expert persons. To the more recent dosimetric inhalers I shall refer later.

Physiology.

The Committee, through its expert members, undertook to ascertain by direct experiment what are the effects upon the tissues, systems, and entire individual of dosing with known percentage mixtures of chloroform in air or a circulatory fluid. Their results are given fully in the appendices of the five annual reports, and are epitomized in the section on the physiology of anaesthesia in the final report. Our knowledge is now sufficiently complete for us to accept as proven that all the tissues of the body are paresed or killed according as the strength of chloroform supplied to them is below or above the safety limit. We owe to Waller the knowledge that nerve tissue is thrown out of function by one strength, but can renew its power of conductivity when the chloroform is removed; that another strength of vapour will promote greater effect, will at first paralyse and then absolutely destroy the conductivity and power of response, so that recovery is impossible. In like manner Sherrington and Sowton have demonstrated that the musculature of the heart, of the hollow viscera, and the voluntary muscles are affected directly as the strength of chloroform which abolishes their function; that abeyance of function merely or destruction of tissue life is simply a question of percentage dosage.

The demonstration that the effect produced varies directly as the strength of the chloroform in air mixture applies not only to isolated tissues, but also to the intact animal. The respiration, the circulation, the functionizing of the nervous system are altered, depressed, paresed, or utterly destroyed according as the percentage strength of the chloroform and air mixture inhaled is raised.

One of the most striking features of the argument is that supplied by Embley and Martin. Their experiments show that chloroform intensifies the irritability of the vagus centres during the induction of anaesthesia, and that the higher the percentage of chloroform vapour in air the more is the vagus liable to inhibit the heart, and through the nervous nexus bring about circulatory and respiratory collapse. If the percentage vapour is kept within the limits ascertained to be safe—that is, below 2—the inhibition of the heart with the concomitant respiratory failure and fall of blood pressure will not prove fatal in the normal animal: section of the vagi restores the equilibrium of life. Above this percentage dogs die, or slowly recover when fatigue of the vagi develops, according as the vapour of chloroform is too high or just within the zone of possible safety. These workers have shown most clearly that one of the chiefest dangers of chloroform is that originating in vagus action, and that this dangeris proportionately great or less as the strength of the chloroform vapour in air mixture inhaled. Such dangers are incident to the period of induction, the period, that is, which clinical experience has taught us is peculiarly one of peril during the administration of an anaesthetic.

Further evidence supporting the view that there is a definite safe maximum is given by the report of a number of cases of human beings who inhaled definite percentage strengths of chloroform vapour in air. The patients were both members of the Committee, willing patients, and hospital patients who were subject to the usual nervousness and dislike of inhaling an anaesthetic. The mixture inhaled and the exhaled breath were estimated. The results obtained were corroborated by the subsequent routine employment of accurate dosimetric inhalers. Thus, although anaesthetic sleep could be produced with lower percentage strengths than 2, true surgical anaesthesia—that is, an anaesthesia from which the patient is not aroused by the skin incision—cannot, as a rule, be induced by less than 2 per cent. Bert and Dubois state that 1.6 per cent. is usually sufficient, but this is not my experience so far as the actual induction is concerned. The usual phenomena of the early degrees of narcosis are recorded by the Committee, but less struggling and fewer

minor complications occur in the dosimetric system. The report records a fall of blood pressure of from 130 to 110 mm. with a 1 per cent., while it fell to 90 mm. with a 1.5 per cent. in ten minutes. So soon as the percentage strength was lessened the blood pressure rose—a fact of cardinal importance when we remember that, as the Committee points out, it has been proved by Embley that failure of respiration is practically impossible when a good blood pressure is maintained.

The respiration grows more shallow coincidentally with the lowered blood pressure, and is increased in volume when the strength of vapour is diminished. The reports supply us with particulars concerning the exchange of gases in the lungs and blood during chloroform inhalation, and we are shown that during the first few minutes the tension of chloroform vapour in the inspired air exceeds that in the expired, while later the difference gradually lessens. That the ultimate effects of chloroform must be upon the tissues needs no emphasizing. At present we do not know what is the tension of chloroform which exists in the immediate vicinity of the tissues; we know that the red blood corpuscles convey the chloroform to the tissues, and it has been suggested that it forms loose aggregations with the proteid or lipoid bodies. It has been shown that whatever bio-chemical changes are effected in the tissues through this aggregation of chloroform are directly proportional to the amount of anaesthetic in the blood stream. When it is increased the tissues take up more and their functionation is diminished; when the tension is lessened chloroform leaves the tissues, re-entering the blood stream to be borne back to the lungs and exhaled in expiration. That some tissues are less affected than others is also proved, and, as the report points out, it is this very differentiation of effect which renders it possible for chloroform to be employed as an anaesthetic, since the respiratory centre maintains its function later than other centres. The fact remains that the continuous action of chloroform brings about progressive paralysis of the component parts of the nervous system, and unless the percentage which is sufficient to induce anaesthesia is lowered during the post-induction stages of narcosis, deeper degrees of narcosis are brought about, and the nerve centres controlling respiration and circulation become paralysed and systemic death must result.

The report, then, advances facts which go far to demonstrate that there is a definite percentage of chloroform in the inhaled air which is sufficient to induce anaesthesia, and this 2 per cent. under normal conditions has not in their experience, as in that of others, led to dangerous consequences in the induction period. I may perhaps quote their conclusions—

1. That a 1 per cent. vapour is insufficient to induce surgical anaesthesia in an adult—at all events, within the limits of time ordinarily available.
2. That a 2 per cent. is sufficient to induce full surgical anaesthesia.
3. That in pathological conditions—such as depraved blood states, some diatheses, grave pathological states—the definite dose or percentage is below 2, and must be determined in each case.
4. That the dosage of the maintenance of anaesthesia is of as much importance as that of the induction period, and the neglect of recognizing this has caused many deaths and constantly delays convalescence.
5. That no definite limit of safety can be fixed for this dose, but that it is in most cases 1 per cent. at first, and must be lowered as time goes on.

What are the methods at our disposal, and how do they fulfil the desiderata?

1. The method of mixtures.
2. Open methods by dropping or by douche.
3. Method by inhalers.

It is obvious that all these methods must achieve some sort of dosage, otherwise their results would be disastrous.

The method by mixtures is a very old one. Dr. Harley suggested diluting chloroform with alcohol and ether as early as 1864, and Bert and his pupils attempted to obtain chloroform vapours of definite strength by mixing alcohol, olive oil, and other materials with the chloroform. The only plan in use at present is to use ether-chloroform, ether-alcohol-chloroform, or alcohol-chloroform by some open-air or quasi-open method, and so we may consider them together.

A considerable amount of work has been done which elucidates the actual strengths of vapours given off by open masks covered by lint, linen, domette, or flannel. Some precision is possible when chloroform is used by itself by estimating the exact amount of that drug given off from an evaporating surface, but when the chloroform has been diluted with ether or other diluent the problem is a very complicated one, involving questions of the rates of volatilization of the constituents of the mixture, the spread of the liquid, and so on. The point about such mixtures is that, however useful they may be in the hands of experienced persons, their use cannot be reduced to scientific rules nor their action limited save by the personal experience and constant vigilance of the person using them. Their dosage can be judged only by their effects; the administrator never knows what precise strength of vapour he is employing.

Waller, Levy, and others have demonstrated very clearly that chloroform dropped upon an open mask gives off vapours the strengths of which vary according to the size of the drop—the douche may be regarded as the extreme at one end of the scale—the rate of dropping, the nature of the material as to the presence of hairs, absorbent properties, and so on, and the approximation of the mask to the patient's face. The percentage may be 2 per cent., but it is more often higher, and the test conditions of the laboratory which control the delivery and size of the drops are hardly to be reproduced in clinical practice. The percentages resulting from douching—that is, pouring one or more drachms of chloroform upon a mask or into a cone—are less uniform than those obtained by a strictly drop method, and are further prone to produce an uneven and intermittent supply of anaesthetic, a strong vapour at the moment of douching diminishing to a very weak one just before a fresh douche is given. Even with the drop method a very high and so dangerous percentage of chloroform vapour can be delivered, and in both plans the regulation of the strength is in practice a matter of guess-work dependent upon the personal effort of the person controlling the supply. He has no knowledge either of the amount the patient is inhaling—since much of the evaporation diffuses chloroform into the room—nor of the strength of the vapour he is giving, and therefore he cannot estimate the actual amount which has already entered the tissues of the person inhaling.

When we pass to the inhalers we come upon more certain ground. The older types: the use of gas-holders, such as Bert employed, of the inhalers of Snow, Clover, and others, has been judged by experience, and they have been rejected either because they are not portable or because they are not exact enough in their deliveries. The modern form of Junker's inhaler, although portable, yet has several disadvantages. The vapour strengths delivered are not rigidly exact, but depend upon the person who employs them, the rate and force of compression of the ball or balls, and the temperature of the bottle as well as the depth of the chloroform contained in this bottle, are all variants which affect the strength of the vapour delivered.

Experiment and clinical experience have shown that the Junker inhaler is capable of giving a dangerously high percentage. The apparatus also affords no clue to the administrator of the actual strength of the vapour delivered at any given moment, nor of variations in the strengths of the vapours given from time to time during a prolonged administration.

The remaining inhalers to be considered are those suggested by Dubois, Harcourt, Roth-Dräger, Levy, Waller, Collingwood, and Alcock. Of these, Harcourt's and Levy's are of the draw-over type; the rest are of the plenum type.

The Roth-Dräger inhaler, valuable as it is in many ways, yet labours under two disadvantages: the one its weight and therefore unportableness, and the other that it has no fixed maximum delivery, and therefore allows excessive strengths of vapour to be delivered if the administrator so wills; as a result deaths from overdosage have occurred during its use.

As to the rival claims of a plenum and a draw-over system, I think much may be said for either system; but it appears to me far more important to establish the principle that dosimetry in chloroform administration should be accepted than to discuss individual apparatuses. I would submit that the criteria of an apparatus which

should be in the hands of every member of the medical profession are:

(1) That it should deliver chloroform vapour in strengths only up to a definite maximum, and this maximum has been put by Snow, Bert, the Committee, and Dr. Waller at 2 per cent. (2) That an index readily seen should show the administrator what strength vapour he is employing. (3) That the strength of the vapour should be easily and rapidly regulated by mechanical means governed by the administrator. (4) That the apparatus can be easily learnt and be quite portable.

The shortness of the time allotted to me prevents me from dealing with the modern types of dosimetric inhalers; these are all described in the report, and to this I must refer you.

It is the unfortunate defect of all plenum inhalers that they require either a motor or a bellows, and such an addition lessens the facility of their transport. The draw-over system has the inherent necessity, which some regard as a defect, of requiring the person inhaling to employ his own respiratory efforts to obtain his anaesthetic. It is, of course, an increased effort, but the experience of some years has convinced me that the effort required is very slight, and does not prejudice even those whose respiratory system is hampered by disease or deformity. I admit that when I commenced to use the draw-over system I was strongly prejudiced against it, and anticipated dangers from dyspnoea and cyanosis. I found, however, none developed, and my prejudice was cured by experience. Probably many who have not used the system still have such a prejudice, and I can only advise them to master the technique of some efficient "draw-over" inhaler, such as that of Mr. Vernon Harcourt, and they will realize the fallacy of such *a priori* reasoning.

The most important point to be considered in discussing a dosimetric system of chloroform administration has yet to be dealt with. The percentage strengths of vapour delivered by any method of mixtures or evaporated from open masks by dropping or douching has been determined either by aspirating with bellows, blowing by willing persons—the experimenters—or other means wholly under the control of those who were making the determination of the percentage. These rigid conditions exist in the physiological laboratory, but, alas, they are quite unattainable when chloroform has to be administered to suffering humanity. This fact it is which renders any method dangerous which does not insure a constant and rigid strength value of chloroform vapour being maintained, whether the patient breathes quickly or slowly, deeply or in shallow gasps, whether he struggles and fights or holds his breath. I do not deny that the skilled man at his best may and does avoid danger even under such adverse conditions and when using an open method of administration, but this does not prove the wisdom of refusing a safe method; it only demonstrates that by the law of chances a danger is escaped for a certain number of times. If we are sure that safety lies in giving chloroform below a certain vapour strength—that is, 2 per cent.—by a method which does not allow of a higher percentage being inhaled, surely it is our duty to adopt dosimetry and preserve the overworked and sometimes inexperienced chloroformist from the haunting dread of chloroform fatality. It seems to me to be equally futile to reject the principle, even though we have objections, possibly valid, possibly not, to an apparatus which, whatever faults it may have, can at least fulfil the main requirements of the method. That dosimetry of chloroform may involve loss of time, may necessitate learning the technique of a new method, and other minor inconveniences, ought not to weigh against an increased safety.

But there is a further and graver aspect of this matter. It is this. The surgery of to-day differs widely from that of preceding decades, and it had and does demand more than mere anaesthesia. Many operators—and it is for them to judge the right of the question—require not only a loss of sensation, abeyance of the function of the nervous system involved in the state of anaesthesia, but a further effect, and one which is only obtained by drugging the medullary centres. It is urged that here dosimetry fails if we adhere to a rigid maximum of 2 per cent. The report, however, seems to me to negative such a contention, for it states explicitly that a 2 per cent., or even less if persisted in for a long period, will after induction eventually affect the medullary centres. Luckily this result in normal persons takes time, but there is no doubt that not only induction of full surgical anaesthesia, but dangerous fall of blood pressure with respiratory enfeeblement, follow the prolonged use of the Committee's maximum. This is why, although 2 per cent. is called safe in the period of induction, it is shown to be dangerous if persisted in for long during the period of maintenance.

As is pointed out in the report, the maximum limit of 2 per cent. is adopted as a probably correct one—certainly for the period of induction. If the exigencies of surgeons call for a deeper degree of narcosis than that which is termed "anaesthesia," this can readily be attained after anaesthesia is reached, and with less risk by dosimetry than by other methods. Its attainment must, from the very nature of the drug employed, be always associated with risk, since deep narcosis carries with it drugging of the medullary centres, enfeeblement of respiration, as well as a dangerous fall of blood pressure. It, however, presents less peril when we know the exact dose we are giving, and therefore know the precise degree of fall of blood pressure, as well as the extent of the respiratory enfeeblement, which are associated with any given percentage strength of vapour employed. We may be compelled by the necessities of an operation to run this risk, but I submit we must do so with a full appreciation of what that risk is, and are bound to adopt the best method—that is, dosimetry—in order to bring that risk within bounds and under control.

In conclusion, I can only express my regret that such an important subject, through the exigencies of time, should have been dealt with in so inadequate a manner, and can only hope that many members of the Association who may be unacquainted with the practical working of dosimetry will take an early opportunity of mastering the requisite technique.

II.—Professor WALLER.

PROFESSOR WALLER said that it was necessary to have at heart as an object the diminution of the death-rate of anaesthetics, whatever the method employed. He would like to endorse all that had been said by Dr. Dudley Buxton and contained in the report of the Chloroform Committee. All were agreed that the limits of the safe administration of chloroform lay between 1 and 2 per cent. In respect to apparatus, he did not trust the accuracy of the Vernon Harcourt apparatus, because he preferred one in which the percentage of chloroform vapour present in the air could be judged from moment to moment. Familiarity with an apparatus of this type, he believed, imbued students with the principles of dosimetry which enabled them to cope with cases, when they had only the roughest means at their disposal, with greater success and safety than they otherwise would have done. For successful administrations by the percentage method the chloroform must be supplied continuously at 1 or 2 per cent.; if for a few moments the administration were discontinued, the patient, being lightly under, would show signs of "coming round."

DISCUSSION.

Mr. ALEXANDER WILSON (Manchester) said there could be no objections to the dosimetric system except in respect of the means used in connexion with it. The apparatus offered was either too cumbersome and expensive or not sufficiently exact to be acceptable to the bulk of the profession. There was no extensive experience of what would be the result of a wide application of dosimetric apparatus in the hands of inexperienced men. It was therefore important to know what might be expected from its extended employment. It would be very easy to overestimate its value and come to rely too much upon the mere apparatus, to the exclusion of other important factors. His own experience of dosimetric apparatus had been confined to the Vernon Harcourt and Roth-Dräger inhalers, the former of which he had used constantly for the last seven years, the latter for five. Altogether he had employed one or other of these instruments in between two to three thousand cases, and for the last two years they had been in daily use at the Manchester Royal Infirmary. In the light of his own experience and that of others, he would suggest "that no dosimetric apparatus would abolish the two fundamental defects of chloroform as an anaesthetic, these defects being its tendency, apparently even in

small doses, to induce paralysis of the circulation and its deficient obtundent" capacity in preventing shock. The tendency to shock had already been in evidence with the Vernon Harcourt inhaler, and would always exist, no matter what apparatus was employed. Secondly, he would also suggest "that it was very doubtful how far the universal adoption of dosimetric methods would materially diminish the death-rate from chloroform." Deaths due to overdose would naturally be eliminated by dosimetry, but there was a class of accident, commonly reported in terms such as:

Chloroform was administered on lint; the patient took it willingly; the breathing was quite free; after a few minutes it was noticed that the respirations had suddenly ceased, the face was pale, the pupils dilated, and no pulse could be felt. All efforts at resuscitation failed, and, beyond a few intermittent gasping respirations, there were no further signs of life.

This class of case would not, he thought, be prevented solely by the use of dosimetric apparatus; some other safeguards were necessary in addition to mere dosimetry. These safeguards were a proper appreciation of the first signs of danger. There was a popular and widespread impression that a gradual cessation of the respirations or a sudden respiratory paralysis was to be looked for and feared, but this was altogether a mistake and most dangerously wrong. The lesion was a paralysis or disorganization of the circulatory mechanism in a subject with a more or less intact nervous system. The earliest gross indications of danger were such as presented themselves in all cases of failure of the circulation, from whatever cause—namely, exaggerated respirations, not gradual impairment. Earlier information of danger even than this could be obtained by observing the pulse, which at the very beginning of the trouble exhibited weakening and loss of tension. If chloroform must be used, no matter by what apparatus, the recognition of the early signs of danger were, if not the best safeguard, at least most important as a means of reducing fatalities.

Dr. SCHARLIEB (London) said that chloroform when given in unmeasured dosage and by empirical and unscientific methods was a powerful poison. No one would dispense hydrocyanic acid or any other powerful poison without using the most scientific methods of measuring the dose. Still more, therefore, was some percentage system of regulating the strength of the dose of chloroform absolutely imperative. There were many different forms of apparatus designed to regulate the dosage more or less accurately. They were only the outward and visible sign, so to speak, of the inward essential—namely, a means whereby they could begin with a minimal dose, gradually increase it within safe limits till anaesthesia was produced, and then gradually decrease it to such dose as would maintain the anaesthesia at such a depth as the requirements of the individual operation demanded.

Dr. PAUL CHAPMAN (Hereford) said that in the county hospital with which he was associated the house-surgeons were invariably unacquainted with any of the precise forms of apparatus for the administration of chloroform. The speaker thought that it was a mistake to allow students in the large hospitals to give anaesthetics by the unscientific open method. Would it be possible to get statistics from any one hospital of the relative number of times chloroform had been given by measured or by unmeasured doses? The report of the Chloroform Commission was valuable, but unduly favoured one form of apparatus. The speaker preferred the Dubois apparatus, the only objection to it being that it was not easily portable.

Dr. A. G. LEVY (London) said that his personal experience of the percentage administrations of chloroform had been mainly derived from the use of the simplified inhaler described by him in the *Lancet* of May 27th, 1905. It was similar in general principle to the well-known Vernon Harcourt inhaler—that was to say, it was of the so-called "draw-over" type. The advantages derived from the use of any good mechanical inhaler were as follows:

1. The facility of increasing or diminishing the strength of vapour by gradually progressive stages.
2. The facility of continuously maintaining a suitable strength of vapour for any desired period.
3. The facility of limiting the strength of vapour to as low a concentration as may be consistent with complete anaesthesia, whereby no more chloroform is put into the patient than is actually required.
4. Knowledge of the percentage strength of the chloroform vapour is a great assistance to the administrator. This knowledge must, however, be applied with considerable discretion.

The conclusions at which he had arrived from clinical investigation on the reaction of the human subject to definite concentrations of chloroform were as follows:

Individuals, both in pathological and normal or comparatively normal conditions, vary considerably in their reaction to a given strength of vapour. It is therefore impossible to fix a precise percentage limit, a so-called "limit of safety," for all individuals. Thus a vapour strength which would be efficient for all individuals would be excessive for many. The conventional 2 per cent. limit is definitely insufficient in a large proportion of cases.[1]

These conclusions in regard to a "limit of safety" were not in accord with the findings of the Chloroform Committee. The want of agreement must be due either to difference of opinion as to what constituted a clinically sufficient state of anaesthesia or to discrepancies in the measurement of the vapour. His clinical results certainly afforded no scope for hair-splitting discussion, for they were striking and convincing. It was quite possible that the "ad plenum" system might be effective with a lower percentage of vapour, on account of the absence of a "dead space" and probably for some further reasons. The "Dubois" was limited to 2 per cent., and was stated to act efficiently. Dr. Alcock's "ad plenum" inhaler was graduated over 2 per cent., and it had been found necessary habitually to exceed this limit when using it. How these contradictory findings in regard to "plenum" inhalers might be reconciled he could not say.

The advent of the regulating inhaler had not reduced the administration of chloroform to the purely mechanical process that was apparently at one time anticipated. Regulating appliances, when properly understood and applied, should provide a relative immunity from death and alarming conditions in general; but every apparatus capable of inducing complete chloroform anaesthesia had the inherent potentiality of causing death, either through inadvertence or as a result of imperfections in existing knowledge of the intrinsic action of chloroform. Respiratory and circulatory disturbances were occasionally met with, especially in the earlier stages of the operation, and the speaker had reported one death as a result of a few inspirations of 3 per cent. vapour before the commencement of the operation. The Special Chloroform Committee reported 4 deaths on the operating table in a series of some 5,000 administrations by the Harcourt inhaler. This was a sufficiently high proportion, even though death were ascribed, as was the case in these instances, to surgical causes. The transfer to the category of "death from operation" of all those cases in which it could be shown that no excessive quantity or strength of anaesthetic had been employed appeared to be a summary way of dealing with the problem of deaths under chloroform. Furthermore, such a statistical method left unrecorded the total mortality under percentage chloroform administration, which alone was of value in comparing non-percentage methods with other anaesthetics. These cases read astonishingly like the accounts of deaths under chloroform when given by ordinary methods, and should have been returned as "deaths under chloroform." These records, therefore, would suggest that some deaths generally attributed to excess of chloroform were not really so due, and it was perhaps unfortunate that the Committee had not more particularly considered, apart from the question of over-administration, to what extent deaths might be conduced by the general action of chloroform, and how far by its administration in too attenuated strength. These cases definitely demonstrated that the extreme limitation of vapour did not tend to protect in any marked degree from the peril of shock and of fatal reflex inhibitions.

As regards individual inhalers, the Vernon Harcourt was a great advance upon any of its type previously produced, but unfortunately it was erratic in its delivery to a degree which had been proved to be of very serious importance.[2] In his own pattern of inhaler, which was of a similar type but delivering over 2 per cent., the faults urged against the Harcourt were thoroughly corrected, possibly at the

[1] See *Transactions of the Royal Society of Medicine*, vol. ii, 1909.
[2] See H. C. Crouch and A. G. Levy, BRITISH MEDICAL JOURNAL, September 24th, 1904.

expense of some degree of convenience. The "shake" error was eliminated, the percentage was unaffected by variations in the type of breathing, and the delivery passages were wide enough to avoid the faintest inspiratory effort. Moreover, it was as simple in its clinical application as any other. The "ad plenum" inhalers afforded results very similar to those of the other type, except that possibly the induction might be rather more satisfactorily carried out. Of the more perfected forms, the Dubois and Dr. Alcock's, the latter was the less cumbersome, and the graduation was preferable, being progressive instead of in abrupt steps. When chloroform had to be employed in the absence of mechanical appliances, far more attention should be devoted to its methodical administration. A useful and simple device consisted of a mask[3] cover divided into sections, which served to restrict the supply of vapour below 1 per cent., or below 1.5 per cent., and so on, according to the section employed. In emergencies, especially those in which a doctor had to work single-handed, such a simple appliance should prove very valuable. Chloroform was an essentially unsatisfactory anaesthetic, and whilst the regulated administration of it tended very largely indeed towards the protection of the patient and the convenience and guidance of the administrator, there could be no royal road to absolute safety. The Dubois and the Vernon Harcourt had now been before the profession for a number of years, and neither had been generally adopted. Was this the fault of the method, or of the inhalers, or of a remarkably conservative attitude on the part of anaesthetists? These questions would be best answered if a number of members of this Section would combine to give the percentage method a thorough personal investigation in all its aspects.

Dr. FIELDEN (Belfast) said there was a difference—not perhaps realized by students and some medical men—between the expression of dosage, say, of a tincture and of chloroform. In the former it was a question of so many minims or drachms, but the dosage of chloroform was the *percentage* of chloroform vapour in the air breathed, and did not refer to the measured quantity of the drug. The Vernon Harcourt inhaler was a valuable piece of apparatus, but there were occasions when more than 2 per cent. of chloroform was inhaled; for instance, in the exaggerated breathing one saw in alcoholics and strong struggling patients air was drawn through the chloroform bottle with such force that almost a condition of bubbling was produced. In such case there must be more than 2 per cent. of vapour. One objection to a vacuum inhaler—such as the Harcourt—was that it could not be used during the performance of an operation upon the mouth. Many cases of abdominal operation required a larger percentage than 2 of chloroform to relax the rigidity of the abdominal muscles. The rigidity might be due to paucity of oxygen; but there were some cases in which the abdominal muscles seemed to have got into a condition of partial spasm from their habit of protecting the diseased abdominal organs.

Dr. H. J. STARLING (Norwich) stated shortly his appreciation of the Vernon Harcourt apparatus; that he had no difficulty in anaesthetizing any and every kind of subject with a 2 per cent. vapour so long as a reasonable period of time was allowed; that the use of the apparatus was of great service in long operations; that the amount of sickness after its use was not so great as after other methods of anaesthetizing; and that sickness when it occurred came on after a delay of six to twelve hours, and then often lasted for a considerable time.

Dr. S. THOMPSON ROWLING (Leeds) mentioned a simple apparatus which he said practically combined the advantages of the percentage inhalers with the simple drop-bottle method of chloroform administration without the disadvantages of either. It essentially consisted in suspending the drop-bottle, the dropping being regulated by the inclination of the bottle, altered by a coarse and fine mechanical adjustment. The rate of administration was regulated by the adjustment, and was read off by a watch suspended close by. The suspension was from a horizontal rod, adjustable both as to height and width over the patient's head, and supported by two lateral vertical supports. The framework was an excellent and efficient anaesthetic screen.

Dr. DAVID LAMB (Glasgow) said that some years ago, when the Vernon Harcourt inhaler was introduced to the profession, he gave it a reasonable trial, but the results did not come up to his expectations. They were sometimes excellent, but in others—young men and alcoholics—he had worked away patiently for twenty minutes or more without inducing anaesthesia satisfactory to the surgeon. If such difficulties occurred in the hands of one accustomed, like himself, to various forms of apparatus, even admitting the possibility or probability of some fault in the administration, what results could be expected in the hands of a general practitioner who gave an anaesthetic only on rare occasions? He found it difficult to persuade those accustomed to administration of chloroform by the simple drop method to use an apparatus, so simple even as that for mixtures of chloroform and ether. So far as general practitioners in Scotland were concerned, the problem of safe anaesthesia would not be solved by any form of apparatus so elaborate and one requiring so much close observation as the Vernon Harcourt apparatus, and consequently necessitating a proportionate loss of attention to the patient. The specialist also, even with dosimetry, would ultimately be forced to fall back on the condition of the patient as his principal guide. The speaker admired the scientific ingenuity of the Vernon Harcourt apparatus, but, after all, it was the man and his experience behind any form of apparatus which was the only safeguard, and it was only by insisting upon every student gaining that experience, possibly on the lines suggested by Professor Waller, that the public could be safeguarded, so far as that was possible at all, when working with such a powerful agent as every general anaesthetic must of necessity be.

Dr. VERNON HARCOURT (London) said that he had arranged several years ago for the delivery of chloroform through his inhaler on the plenum system. He had brought the arrangement with him, and would show it later in the day. He believed the instrument maker had no grave difficulty in keeping alike the size of the bottles and the adjustment of the specific gravity bulbs on which the percentage of chloroform depended. According to his analyses, the percentage of chloroform was diminished when the rate of passage of air increased. The construction and use of his apparatus depended on chemical and physical principles, which need not be discussed.

Dr. MACGREGOR YOUNG (Leeds) thought that the argument advanced, that a knowledge derived from mechanical apparatus of the percentage of chloroform present by smell would prove very useful, even when the anaesthetist had no apparatus, was fallacious, as the anaesthetist could not, from the nature of the case, keep smelling for the strength of the vapour.

Dr. DUDLEY BUXTON, in replying, said several speakers had referred to the possible dangers of the Vernon Harcourt inhaler through inaccurate construction by the instrument makers. The criticism, of course, applied to all inhalers and to all scientific instruments. If valid, physiological work, physical and chemical research must be regarded as open to attack on the same score. Experience, as well as testing, had proved that the present form of the Harcourt inhaler was accurate for all practical purposes. He deprecated the remarks of Dr. Chapman in respect of the attitude of the Committee towards the Vernon Harcourt inhaler. The description in the report of the Dubois inhaler was that given by Dr. Raphael Dubois, the inventor, and references were also given to the luminous papers written by Dr. Chapman himself, so that it was inaccurate for Dr. Chapman to say the Dubois apparatus had been ignored. Its merits were recognized and extolled, but it was too well known to need any exploitation. Mr. Alexander Wilson's remarks about shock really emphasized the value of dosimetry. Shock meant fall of blood pressure, fall of blood pressure meant less chloroform—a lower percentage was required. To achieve the change a dosimetric inhaler was the only practical means. Of course, an inhaler was only a scientific instrument; it required the guiding hand of a competent person. The Vernon Harcourt inhaler

[3] This is made by Messrs. Allen nd Hanburys.

was only a safeguard against overdosage; other difficulties and dangers would be dealt with by the anaesthetist, but he would do this better if he employed a scientific instrument rather than a haphazard method of mixtures or drops. Dr. Levy was quite incorrect in stating the cases of death cited in the report were due to the chloroform, and as an expert his knowledge would convince him that the phenomena of chloroform poisoning were quite definite; the symptoms of other accidents due to surgical causes were as distinctive, and no one could make the mistake at which Dr. Levy had hinted. No method employed could be independent of surgical dangers, but an exact method gave more chance than a haphazard one. It had been suggested that dangers arose through light "anaesthesia." He (Dr. Dudley Buxton) had pointed out again and again that there was a wide distinction between light and incomplete anaesthesia. No evidence of any value existed which showed that a fall of blood pressure—that is, shock—was engendered by light anaesthesia. Incomplete anaesthesia—a state in which conveyance of painful peripheral stimuli was possible—could and often did produce sudden fall of blood pressure. The skilled anaesthetist would always avoid incomplete but aim at light though adequate anaesthesia. So far from lessening shock by deepening narcosis, the reverse was the case, since as narcosis became more profound so did the blood pressure fall, and the patient entered a zone of increased peril. The plan of regular dropping from a fixed chloroform bottle was not a novelty—it was figured, for example, and described in Dr. Dubois's book on anaesthetics, published in 1894, and was offered as an a ternative to the use of the Dubois machine.

DISCUSSION ON THE PREVENTION AND TREATMENT OF SHOCK.

OPENING PAPERS.

I.—GEORGE ROWELL, F.R.C.S.,

Senior Anaesthetist, Guy's Hospital.

IT is obvious that the prevention and treatment of shock during anaesthesia must depend upon our knowledge of the physiology of the subject, and while this is at the present time well enough understood in its essentials for the practical requirements of the anaesthetist, yet there are many points of deep interest to us which will be dealt with by the distinguished scientists who have promised to take part in this discussion, to whom, first of all, I would beg to offer, on behalf of this Section, our best thanks for their kindness in coming here to help us; and while resisting—I confess with difficulty—the temptation to allude to those of our own country whose work upon the subject has been of so much value to us as administrators, one cannot allow this occasion to pass without expressing a hearty welcome to Dr. G. W. Crile, by whose presence, I do assure him, we feel peculiarly honoured.

For the sake of convenience, we may include under the term "shock" all degrees of serious impairment of the circulation, whether produced by accidents, psychic causes, reflexes during narcosis, asphyxia, haemorrhage, toxaemia, or exhaustion.

In addition to the symptoms of circulatory enfeeblement which are encountered from such causes, I may here, as a little practical point, allude to the fact that an enlarging pupil is a common quantitative, and, although somewhat rough, often a most helpful, guide.

While endeavouring for many reasons to keep strictly to the clinical side of the subject, I take it that very few in this room will dissent from Dr. Crile's view that the one essential characteristic of conditions of shock is a low blood pressure. Most administrators of anaesthetics will agree that a falling blood pressure is the first sign of the onset of shock, and that its rise is equally the first real sign of recovery. It will also be generally conceded that next to keeping the respiration adequate, it should be our constant care to keep the blood pressure as steady as possible, and, in the event of shock occurring, to endeavour to restore it, as soon and as efficiently as we are able, to the patient's normal level.

Now, it is well recognized that too large a dose of the anaesthetic employed, as of other poisons, will produce symptoms of shock. And, omitting the question of how much or how little of the patient's reflex system should be kept excitable in any particular case—since the knowledge of this depends entirely upon the experience of the administrator—let me first briefly consider the comparative effects of the most commonly used anaesthetics.

Very few who have had experience doubt that chloroform is the least desirable anaesthetic to employ to prevent shock; that ether is the best, and that in mixtures the prevention of shock is assisted, so far as the nature of the anaesthetic can assist it, in direct proportion to the preponderance of ether and in inverse proportion to the percentage of chloroform present. Of this truth I am able to show you proof, not that the facts do not appear in the classic tracings of Crile, but I am fortunate in having the results of a very careful and extensive research undertaken by Dr. C. D. Edwards upon the influence of anaesthetics on the blood pressure, which is shortly to be published in the *Guy's Hospital Reports*. Dr. Edwards has taken blood pressures by a Riva-Rocci sphygmomanometer throughout no less than 144 administrations of various anaesthetics under ordinary hospital conditions.

In his 17 chloroform cases the blood pressure fell in all, the fall beginning early in the administration. The chief point that comes out in this series is that the fall usually varies at once, and in a marked manner, with the depth of the narcosis. As an instance of a chloroform blood-pressure chart, I exhibit one showing clearly a fall from 145 to 80 mm. of mercury in ten minutes, accompanied by a pulse which became slow and feeble. On withholding the anaesthetic the blood pressure in a few minutes rose to 120, and the pulse improved. During the operation manipulations in the splanchnic area caused a fall of blood pressure to 50, while the pulse rose to 110, and became very weak. In Dr. Edwards's 23 cases of the A.C.E. mixture the blood pressure fell below normal during the administration in 21, and the average blood pressure was below normal in 70 per cent. The fall was less than the fall under chloroform.

In 5 cases of a 1 to 2 C.E. mixture—that is, with the same proportion of chloroform as is contained in the A.C.E. mixture—it appeared that the depressing effect was less marked than with pure chloroform, but more marked than with the A.C.E. mixture.

Of 53 ether cases, only 4 had an average blood pressure below normal, and in 39 of the cases (74 per cent.) the blood pressure never at any moment fell below normal. Further, in those cases in which the blood pressure did fall below normal, this could never once be attributed to the anaesthetic, and it is particularly noteworthy that in every one of the ether cases there was an initial rise above normal.

Within comparatively wide limits an increase in the depth of ether narcosis appeared to raise the blood pressure; showing, what one's clinical experience had taught one, that ether acts as a stimulant in both smaller and larger doses than are ordinarily employed in practice.

I exhibit a typical chart of an uncomplicated ether administration, lasting eighty-five minutes, for ovariotomy and appendicectomy, which shows a blood pressure raised throughout and with very little variation.

As regards obstructed respiration in its relation to shock, Dr. Edwards's cases show, more plainly than either he or I had imagined, its general effect in causing a fall of blood pressure, both with ether and with mixtures. Although with embarrassed respiration the initial rise of ether was increased, any degree of cyanosis soon caused a marked fall, which varied with the degree of obstruction. The fluctuations of blood pressure with obstructed breathing were generally three times as large as in cases in which this factor was absent.

The previous condition of the patient is, after all, the most important factor for the administrator's consideration when an anaesthetic is to be given; and conditions of cachexia, starvation, anaemia, pyrexia, toxaemia, and shock from injury, all demand special care to prevent shock during the administration. The duration and character of the operation have, of course, also to be considered in the same connexion. Most of the surgical procedures which are likely to produce shock are well recognized. But I may, perhaps, instance excision of the rectum in the male, involving a thorough cleaning out of the cavity of the sacrum, as, in my experience, one of the operations which requires most care on the part of the administrator.

Ether given by the open method is an anaesthetic which, after a large experience, I have no hesitation in describing as a powerful preventive of shock. The blood pressures taken during the use of this method by Dr. Edwards were only eleven in number, and in some instances the ether was given after induction by other methods; but his reports show, what exactly accords with clinical experience, that there is much less respiratory obstruction and consequently much less initial rise of blood pressure, while the succeeding observations rarely show a drop below normal. The blood pressure under open ether keeps remarkably steady, with very slight and trivial fluctuations.

The pressor action of ether, particularly when the open method is employed, seems to me to demand its general employment in all cases in which it is not specifically or reasonably contraindicated. By reason of its stimulating effect, the centres constantly receive a good supply of arterial blood, and I have no hesitation in saying that those who have used this method at all extensively will prefer it before all others—at any rate, in cases in which shock is to be feared. In such cases it is also important to place the patient in the most favourable condition apart from the question of the anaesthetic. For example, man when anaesthetized being a cold-blooded animal, it is important to keep the temperature of the room high, and nutrient enemata are often of value before operation in ill-nourished subjects. So are good feeding, rest, and regular small doses of strychnine for a few days before the operation.

But the most important means at our disposal for placing a patient in a condition to resist shock is the transfusion of saline fluid before and during the administration. This procedure is one of the many important advances that surgery owes to the genius of Arbuthnot Lane. He first employed it as long ago as 1891, and continued its use in spite of the dicta of eminent physiologists, who pronounced it of no value. In Mr. Lane's latest apparatus for its employment the bag he uses is filled with normal saline solution, then closed, and the whole apparatus boiled for five minutes in a sterilizer. It is then put under a cold-water tap for a few minutes until the bag can be comfortably borne when held tightly against the cheek. That means that the temperature of the fluid is from 110° to 115°, and, as it cools down in the tube, it will be of the proper temperature when running slowly through the needle. The skin is sterilized by rubbing for a few minutes with a solution of biniodide of mercury in spirit, and the fluid allowed to run from the needle on to the back of the wrist before introducing the needle, to assure oneself that the temperature is suitable. If it can be comfortably borne, the needle is then introduced into the cellular tissue, the tap turned, and the bag hung some two or three feet above the point of delivery. In all serious conditions of the patient, and in all grave operations, this should be done before the anaesthetic is commenced and the process allowed to continue during the administration, the needle being left *in situ* until the end of the operation, when it is removed, a small piece of sterile gauze placed over the hole and covered with a piece of strapping. In extreme cases as much as four or even five pints may be given in this way during the course of an operation; and experience has shown that symptoms of shock rarely arise when this precaution is taken, and when they do arise are not serious. In the large number of cases in which I have used this method, and in which it has been employed by surgeons in cases that I have anaesthetized, I have never known of any harm to result from its employment.

There is one drug which has a remarkable and lasting effect upon the blood pressure, and is consequently of the greatest value in the prevention and treatment of shock. I allude to the extract of the infundibular portion of the pituitary gland. I have now had fifteen months' experience of this drug, the results of which may be of interest. In each case I have employed the preparation of Messrs. Burroughs, Wellcome and Company, which is a 20 per cent. solution put up in these glass bulbs, each containing 1 c.cm. I have used it more than twenty times, twice experimentally, and on every other occasion in cases with marked symptoms of shock, and on no occasion has it failed to produce a considerable and lasting effect. Its most striking property is that its effect is still obvious after twelve to twenty-four hours, and in some instances even longer. The tracing exhibited shows its typical effect on the blood pressure of a pithed cat, for which I am indebted to the kindness of Dr. H. H. Dale. The only doubt I have had about this drug was as to its keeping properties, although I had used it when six months old with apparently the same result as a fresh sample. Dr. Dale has very kindly provided me with a beautiful tracing showing a comparison between the effects of a new preparation and the oldest one at his disposal, which had been in his laboratory cupboard for more than fifteen months. You will see that, allowing for the succeeding injections, the rises caused by the two preparations given alternately are practically identical; so that Dr. Dale can definitely say that it retains its activity unaltered.

Although I have used pituitary extract in some very grave conditions, I have never had to employ more than one dose. Dr. Edwards took blood pressures in 7 cases in which this drug was used—twice intravenously, and five times subcutaneously. When used subcutaneously the longest time before its effects were obvious was thirty minutes, the shortest five minutes; intravenously it acted immediately. All the cases showed a raised blood pressure when it was taken after some hours, and in one case the blood pressure remained raised for three days. I do not advocate the use of this drug until there are some symptoms of shock, but employed then in conjunction with saline transfusion it is of the highest value. If the emergency is urgent, both can, of course, be given intravenously. This chart shows their remarkable effect in an extreme case, and also shows how the blood-pressure observations made it possible to regulate the infusion of saline solution for more than half an hour, so as to maintain sufficient blood pressure to complete the operation.

In concluding my remarks, which I fear have already taken too much time, I wish to call attention to the connexion of low blood pressure during the administration with after-sickness. When the blood pressure has been kept up by the use of open ether and saline transfusion, sickness is either conspicuously absent or slight and transient, even after long and severe operations, and the patients commonly make good recoveries.

With this very imperfect review of the subject, I must beg your forgiveness if at any time I have seemed to place in undue prominence my own experience—for my only object has been to inaugurate a good discussion.

II.—GEORGE W. CRILE, A M., M.D.,
Cleveland, Ohio, U.S.A.

DISREGARDING the influence of the particular anaesthesia used, the manner of its administration, and the physical condition of the patient, and considering only the influence of the operative technique upon shock in operations performed under inhalation anaesthesia, it seems best to divide the subject into two parts—first, the relative shock-producing value of the various tissues and organs; secondly, the method of operating with a minimum shock.

The several regions of the body have varying shock-producing values, which, at least in part, correspond to the ticklish regions. In recent experiments I have found that the brain substance has virtually no shock-producing quality. The maximum is found in the trunk, and in the extremities. The abdomen is more susceptible than the back; the sole and palm more than the dorsum; within the abdomen, the region of the diaphragm, more than that of the pelvis; the kidney, the ureters, and the urinary bladder have a relatively low shock value, while the omentum is practically a negative tissue. The peripheral nerve trunks have marked shock value. As a general statement, the more a part in the course of evolution has been exposed to injury, the greater the shock reaction when subjected to operative trauma.

The kind and amount of trauma employed by the surgeon is the single item of greatest importance.

Sharp division of *tissue* causes the least disturbance. Crushing, tearing, and dragging on tissue causes the greatest amount of shock. Perhaps the most shock-producing type of trauma known is that used by the carnivora in killing their prey, or fighting with each other. That type of trauma is almost specifically shock-producing.

One operator, therefore, may in the performance of precisely the same technique cause more shock than

another. Occasionally one sees a surgeon employ the technique of the carnivora.

It is well, also, to bear in mind that in inhalation anaesthesia only a part of the brain is asleep. Complete anaesthesia of the entire brain produces suspended animation, or death. The medulla at least is but little affected, and the response of the unanaesthetized portion of the brain is constantly observed in the course of operations—for example, the altered rate and rhythm of the pulse and the respiration, the change in the vasomotor tone, as indicated by the fluctuation in the blood pressure, the contraction of muscles, and, under light anaesthesia, purposeless movements of the body, all show that a large portion of the brain is either partially or not at all anaesthetized. These subconscious phenomena represent the discharge of nervous energy in response to mechanical stimulation of the nociceptors, and are vain, subconscious efforts of defence or escape. The greater such subconscious action, the greater the shock. In bad risks this subconscious response should, if possible, be wholly excluded by the combination of local with general anaesthesia—the local anaesthesia physiologically blocking the afferent impulses—thus sequestering the brain from harmful impulses.

In a given operation the surgeon and anaesthetist should work in symphony. The anaesthetist should be warned in advance of a move in the technique which will send a flow of impulses to the brain, discharging large amounts of energy, and tending to force the patient out of quiet anaesthesia.

Being warned, the anaesthetist then will not, therefore, give an overdose of anaesthesia by the increased exchange of air in response to the reflex stimulation of the respiratory centre by trauma.

The conservation of blood is an important point in the prevention of shock. Not only is the prevention of the loss of blood important in itself, but a dry field requires less trauma incident to sponging. In operations upon the larynx the reflex inhibitory impulses should be prevented by the local application of cocaine.

In operations within the mouth and the nose, the provision for quiet continuous anaesthesia by means of tubage of the pharynx is an advantage to the patient, the anaesthetist, and the surgeon—to the patient, because it prevents the danger of bronchopneumonia from inhalation of blood; to the anaesthetist, because it gives him a fair opportunity to administer an even anaesthesia; and to the surgeon, because he can work as consecutively as if the operation were made for hernia.

Another, and in my opinion a most important point, is the exclusion of the factor of fear—at least in certain patients and in certain diseases.

In Graves's disease I have seen fear alone cause death. These patients, being pathologically susceptible to fear, may be anaesthetized and operated on as follows:

Consent for operation having been obtained in advance, the patient while in her bed is given, under any pretext, inhalations by the regular anaesthetist, using the anaesthetizing apparatus, but substituting any volatile oil for the anaesthetic. After this measure becomes a commonplace, ether is in some instance cautiously added until primary anaesthesia is attained. This is merely a practice march. On the day of operation, the patient is unconsciously anaesthetized in her bed, while the ward cart is waiting outside the door to carry her at once to the operating room. When ready to begin operating, nitrous oxide is substituted for ether, and the entire field of operation is cocained just as carefully as if the patient were receiving no general anaesthetic. In this manner this most difficult class of patients, because of their maximum discharge of energy on a minimum traumatic or psychic stimulus, may be mastered. The complete isolation of the brain from the inflow of impulses both traumatic and psychic is the key. The conservation of nervous energy, by thus breaking completely the connexion with the associational centres of the brain, is in many cases other than Graves's disease of the highest importance.

Every anaesthetist is familiar with the troubled, restless behaviour of the subconscious brain in patients frightened before or during the early stages of anaesthesia, and every surgeon knows that the post-operative course in such cases is not so even.

In recent experiments I have found, as I believe, that uncomplicated fear may cause morphologic changes in the brain cells, and Dolly and I showed that uncomplicated trauma caused morphologic changes in the brain cells. Now, if operations could be so performed that the perception of fear could be excluded, and the traumatic impulses incident to the technique could be blocked, then the brain would remain in a neutral state during the entire operation. Such a brain should go unscathed and experience no post-operative impairment. I have repeatedly verified the correctness of this point. A combination of morphine and scopolamin two hours prior to operation, a minimum show of preparation, nitrous oxide anaesthesia, and in some cases local anaesthesia as well, and the most gentle handling of tissue minimizes post-operative nervous phenomena, which, as I believe, is merely a later phase of psychic and traumatic shock.

Since this discussion is intended to touch upon only the prevention and the treatment of shock, I shall make no statement as to the pathology, excepting upon one point as bearing upon the treatment—namely, the brain cells, especially those of the cortex and cerebellum, show morphologic alterations, whatever the point of application of the shock producing trauma. Until some new principle is discovered whereby these morphologic changes may be restored at will, I can conceive of no specific remedy for shock. Morphine has a certain advantage in the rest it secures. Apparently the only means of restoration is rest. These statements are intended to apply only to the lesion in the nerve cells. But there is a great danger secondary to the lesion in the nerve cells; indeed, it is a link in the vicious circle—namely, the consequent anaemia. Anaemia itself adds to the lesion made by trauma. Fortunately anaemia may be overcome, even when the commonly employed methods—such as posture, bandaging, saline infusions, etc.—fail. The gravest stages of anaemia may be overcome, provided, of course, the brain cells are not fatally damaged, by the direct transfusion of normal human blood. In desperate risks the donor may be placed on a table alongside of the patient, and in the course of the operation blood may be transferred as required to sustain the circulation of the patient. The efficiency of transfusion is indicated by the fact that if a sufficient amount of blood is transferred the circulation may be continued independently of the central nervous system. A carefully over-transfused dog may be decapitated without a fall in the blood pressure.

The prevention of shock in operations under inhalation anaesthesia is, as it seems to me, most effectively accomplished by the conservation of the energy of the patient—by the prevention of the loss of heat, loss of blood, the exclusion of psychic influences, a minimum trauma of sensitive tissue; by a feather-edge dissection, and in certain cases a double anaesthesia, central and peripheral, thereby wholly sequestering the brain and wholly preventing shock. Once there is shock, the treatment consists in overcoming anaemia and securing physiologic rest, which alone can restore the damaged brain cells. When all other measures fail the direct transfusion of blood is indicated.

III.—P. LOCKHART MUMMERY, B.C., F.R.C.S.,

Senior Assistant Surgeon, St. Mark's Hospital for Cancer, Fistula, and other Diseases of the Rectum; and Senior Surgeon to Out-Patients, the Queen's Hospital for Children, Hackney.

THE definition of surgical shock which is now practically universally accepted is "a condition of lowered blood pressure resulting from exhaustion of the vasomotor centres." The truth of this definition rests upon a sound scientific basis of experiment, and, moreover, fits in with all the known clinical facts. Its first recognition is due to Dr. Crile's original experiments, the correctness of which have been verified by Cushing, myself, and others, during the last six years.

I think I am not overstating the case when I say that the discovery of the nature and causation of surgical shock, and more especially of the vital importance of the maintenance of the blood pressure and of conserving the integrity of the vasomotor centres in all such conditions, is one of the most important developments which has taken place in scientific surgery in recent years, and one which has already done much to save human life. I would especially insist upon the importance of preventing shock during surgical operations, as it is a condition easily

prevented, but difficult to treat successfully when once well established. If the physiological factors which operate in causing shock are known, there should be little difficulty in preventing shock.

This is not the time or place to discuss the different details of surgical technique by which the surgeon may prevent shock during long and serious operations, as although these factors are of the greatest importance, they do not come within the control of the anaesthetist.

During the progress of an experimental research into the causes of shock, carried out by Dr. Symes and myself during the last five years, two facts in the relationship between the anaesthetic and shock particularly struck me as important. First, shock more readily occurred when chloroform anaesthesia was used; and, secondly, the deeper the anaesthesia, the less effect did operative procedures have in producing shock. Thus, if the animal was kept under ether in the condition ordinarily understood by surgical anaesthesia—that is to say, in such a condition that the superficial reflexes were abolished—shock slowly developed as the result of surgical procedure. If, however, the animal were kept under very deep anaesthesia, so that the deep reflexes were also abolished, and especially if, in addition, morphine were administered, it was then found almost impossible to produce shock—that is, surgical procedure produced practically no effect upon the blood pressure. We have to take into consideration the fact that anaesthesia itself produces shock if administered for any length of time. This applies especially to anaesthesia produced by chloroform, in which there is a progressive fall in the blood pressure from start to finish, and a very serious degree of shock will ultimately result from this alone. Although the same applies to some extent to ether, it is not so marked, and by choosing a combination of deep ether anaesthesia, or ether-morphine anaesthesia, we have a very good preventive to production of shock during operation. I therefore consider the ideal anaesthetic, in cases where shock is a possible factor in the case, is ether by the open method combined with morphine, administered hypodermically; though I think that a mixture of ether and chloroform combined with morphine is, perhaps, equally good for this purpose, and for other reasons often preferable.

Keeping the patient warm during the progress of a long abdominal operation is most important, and, with this end in view, my own practice is to have a Gamgee suit made consisting of trousers and jacket, which is worn during the operation, and necessitates only the abdomen being exposed. It is also, I believe, most important to keep the wound area covered as much as possible by towels or sterilized pads. I think that the use of the Trendelenburg position during abdominal operations is of great value in preventing shock. By its use we call in the aid of gravity to maintain the blood pressure in the vital centres. I think that whenever possible the Trendelenburg position should be used for cases where shock is a possibility. In this connexion, however, there is one precaution which it is most important to observe—namely, that the abdomen should always be tightly bandaged *before* the table is lowered, otherwise serious and sudden collapse not uncommonly occurs.

The administration of morphine just before the operation is of undoubted value in preventing shock. It acts by cutting off the afferent sensory impulses passing to the brain and vasomotor centres from the field of operation. I know that some anaesthetists object to it on the ground that it is an anaesthetic over which one has lost control when once administered. But I do not quite see the force of this argument, as morphine is not a complete anaesthetic by itself, and after its administration total anaesthesia still remains under control by the anaesthetist. Personally, I have never seen anything but good result from it when used in combination with ether and chloroform.

I most cordially agree with Mr. Rowell in advocating the use of continuous subcutaneous infusion of saline solution, during long abdominal operations, as a means of preventing shock. I believe it to be of the utmost value. I have used it in all serious operations for some time, and am certain that by means of it I have obtained results otherwise impossible.

With regard to the treatment of shock. This depends for its success upon our being able to maintain the blood pressure at or near the normal level by artificial means until such time as the vasomotor centres have recovered. Strychnine, or any kind of stimulant, is absolutely contra-indicated, and will do serious harm. Small doses of morphine are of much more value than stimulants. Our chief object will be to maintain the pressure in the vital centres by maintenance of the "head-down" position, and by bandaging firmly the limbs and abdomen. In serious cases these measures should be supplemented by intravenous infusion with weak solutions of adrenalin—a drug which gives us absolute command over the blood pressure, even when the vasomotor centres are paralysed or destroyed. The drug, however, which promises to be of most practical value is an extract of the infundibular portion of the pituitary gland. This drug, like adrenalin, will raise the blood pressure independently of the vasomotor centres, but has the great advantage that its effect lasts for some considerable time. As in the case of adrenalin, it is essential that it should be administered intravenously when there is any serious degree of shock, or it will have no chance of reaching that part of the circulation where it can exert its action.

Lastly, it is of importance to administer some easily assimilated nourishment at frequent intervals to patients who are suffering from shock.

IV.—J. D. MALCOLM, F.R.C.S.Edin.,

Senior Surgeon, Samaritan Hospital.

No one can appreciate more highly than I do the work of Dr. Crile, but I would fain persuade him that, in regard to shock, it is capable of an interpretation other than that which he has given. He teaches that the vasomotor centres are paralysed in shock, and it is well known that when these centres are out of action all the small vessels dilate. But he has also asserted that both before and after death from shock

> The arteries were quite empty, the tissues pale. . . . There was a manifest transference of the blood from the arteries and capillaries to the veins. . . . The relative proportion of blood in the arteries and capillaries and that in the venous trunks gave a rough estimate of the depth of the shock.[1]

He also said that when the splanchnic area was not involved in the manipulations of an experiment,

> Autopsies did not reveal a condition of vascular distension in this area different from that of other areas.[2]

These statements describe exactly the conditions which I have often observed in the peritoneal cavity as shock developed. The tissues become extremely pale and bloodless, and Crile's fuller statements seem to me to indicate with certainty that the arteries and capillaries of the animal observed were powerfully constricted, or that its venous trunks alone were relaxed. These facts appear to me to be irreconcilable with his theory.

Crile also said that he could always raise blood pressure by injecting saline solution into a vein, but that the rise was less sustained as the state of shock developed. In cases of deepest shock he found that the blood was little diluted by the solution, which rapidly passed out of the vessels into the tissues, causing oedema and sometimes death.[3] These observations seem to indicate that the capacity of the vascular system did not increase. Again, it has been demonstrated by Sherrington and Monckton Copeman, and by Cobbett and Roy, that serum escapes from the blood into the tissues as a consequence of injuries, and the vessels must contract, actively or passively, if their contents diminish.

The effects of strychnine as described by Crile[4] are instructive. He said that this drug brought about the vascular conditions characteristic of shock. When convulsions were prevented by curare, strychnine in large doses produced a marked prolonged rise of blood pressure, which was followed by a fall to subnormal. Each consecutive dose caused a less extensive rise, followed by a greater fall until a very low blood pressure was established. Arterial contraction was clearly the cause of the rises of pressure, and Crile asserted that the excessive fall indicated an excessive vascular relaxation. But in arriving at this conclusion he did not even mention the

[1] *Surgical Shock*, by Geo. W. Crile, p. 142.
[2] Loc. cit., p. 139.
[3] *Blood Pressure in Surgery*, pp. 269-70.
[4] Ibid., pp. 266-68.

possibility that the fall of pressure might be due to a loss of fluid; and it seems to me that unless this possibility is excluded a low blood pressure does not offer any proof that the blood vessels are dilated or paralysed.

That much fluid escapes from the body in the state of shock must be obvious to any one who has seen a typical case of rupture of a gastric ulcer into the peritoneal cavity, and the importance of this loss will be recognized when the effects of even a slight haemorrhage upon developing shock and the necessity for administering fluid to promote recovery are considered.

Other facts have been put forward in support of the view that the vasomotor centres become paralysed in shock, but many of these seem to have been observed in pithed animals. Such observations may illustrate the vascular conditions that should arise in shock if the vasomotor centres are paralysed in that state, but they are altogether irrelevant as proofs of Crile's theory until it is shown that the vascular changes are the same in both cases—for example, that the "quite empty" arteries described by Crile as occurring in shock are also developed after pithing. I believe that these two conditions differ widely from each other, and the whole trend of recent physiological work seems to me to be opposed to the idea that the vasomotor centres are paralysed in the state of shock. W. T. Porter[5] and M. G. Seelig[6] have published records which directly negative this view, and Yandell Henderson[7] has propounded the acapnia theory. He showed that shock is always accompanied by a diminution of the amount of carbon dioxide in the blood, and he was able at will to prevent, or cause, or cure the vascular changes characteristic of shock by regulating the amount of this gas in the tissues. He showed, moreover, by volumetric records of the output of the heart, and Eugene Boise[8] has independently pointed out, that a sufficiently intense stimulus to cardiac contraction causes the heart to pass into a state bordering upon that of tetanus, so that its propelling power is abolished and the carotid blood pressure falls. These authors agree in asserting that in shock the vasomotor centres are in a state of intense hyperactivity. Henderson says that the fall of blood pressure in shock "is not due to abolition of the peripheral resistance in the arterial system. No inhibition or fatigue or failure of any sort occurs in the vasomotor nervous system. On the contrary, this mechanism is intensely active in an effort to compensate the lessened blood stream."[9] Henderson's views on the necessity for maintaining a fairly high percentage of carbon dioxide in the blood, and his description of the conduct of the heart when there is too little of this gas, have also been confirmed by E. Jerusalem and Professor Starling.[10] But a fall of carotid blood pressure arising from an intense vascular contraction is possible only if fluid escapes freely from the vessels into the tissues or out of the body. The chief danger of developing shock is that the tissues may be starved by arterial contraction. After shock is well developed, if its causes cease to act, the vessels will relax and a great fall of pressure must occur not only in proportion to the vascular relaxation, but also in proportion to the amount of fluid that has been lost. The conditions at this time simulate in some respects those of a pithed animal, but the phenomena are really closely comparable to those of a severe haemorrhage, and the danger of the low blood pressure during recovery from shock is that syncope may occur. Thus there are two causes of a low blood pressure—one occurring only in the most advanced state of developing shock, the other arising more or less in all cases as recovery is taking place. These two conditions of low blood pressure should be clearly differentiated.

I am persuaded that the improved methods of administering anaesthetics have done as much as, if not more than, surgical advances to abolish shock, and I feel sure that the work of Yandell Henderson will give the anaesthetists still greater power in this direction. The regulation of the amount of carbon dioxide in the body is mainly effected through the lungs. A too free ventilation should be prevented. Morphine, given before an operation, tends to quiet the respiration, and should be administered, if it is not otherwise contraindicated. If an increasing rate of the heart action seems to show that an onset of shock is imminent, the patient should be made to rebreathe his own breath through a long tube or to inhale a mixture of carbon dioxide and air. But only a slight excess of this gas is required. In large excess it acts as a powerful cardiac depressant. The effects of oxygen are somewhat in dispute. It seems to me that it should be given freely.

When the causes of shock are active everything possible should be done to minimize the effects of injury by giving sedatives and vaso-dilators, either in anticipation of mischief or when occasion arises, and by keeping the patient warm. No vaso-constrictor should be given at this time. After shock has developed, if its causes cease to act, the tendency to recover is spontaneous, but the patient may require stimulation, and perhaps assistance to keep him breathing until carbon dioxide reaccumulates in the blood in sufficient quantity to induce voluntary respiratory efforts. In this stage all the methods described for maintaining the blood supply to the central nervous system are useful. Vaso-dilators should not now be given. On the contrary, dilatation should be controlled until a sufficient quantity of properly constituted blood is restored to the body, and strychnine in small doses is by far the best drug for this purpose. The use of adrenalin and extract of the infundibular portion of the pituitary body seems to me to be recommended entirely because of their action on pithed animals. I have seen no reason to believe that the advantages of their administration in the treatment of shock are due to anything but the fluid with which they must be given. One of the chief necessities during the stage of recovery is that fluid should be given freely. It is needed as soon as the vessels begin to relax, and this want should be anticipated by a subcutaneous injection of saline solution. Particularly in septic cases, and in cases of great debility, such an administration is urgently required to prevent shock during, after, and even before, an operation. The fluid supplies a waste product that is being rapidly lost; and it may, therefore, be said to act as a food. In the stage of recovery saline infusion into a vein is not necessary, and Crile's description of the effects of forcing fluid into the venous system when shock is developing shows that such treatment at that time gives rise to serious danger from oedema in and around the lungs.

In conclusion, I would urge that as the state of shock develops, there arises an intense and increasing stimulus to contraction of the vascular system, which in advanced cases may give rise to a low blood pressure from over-contraction of the heart—a condition of great danger—but that the low blood pressure commonly observed in non-fatal and less severe cases is a secondary phenomenon due principally to loss of fluid from the vessels. I have never undertaken any experimental work, but I have seen a great deal of abdominal surgery, and before Crile's theory was published I opposed the idea that there is any kind of vascular relaxation as the state of shock develops. That idea does not help me to understand any clinical observations I have ever made.

Moreover, Crile himself seems to me, in the passages I have quoted from his writings, to support not his own but the opposite view, and if he could be persuaded to give these passages their full value, I do not think he could avoid joining in the belief that the primary phenomena of shock are due to an intense arterial contraction.

The acapnia theory, which involves this view, seems to me full of promise for usefulness by explaining clinical phenomena, and by suggesting practical measures for treatment.

DISCUSSION.

Professor LEONARD HILL (London) said that from a physiological point of view shock was caused by a paralysis of the synapses by a widespread injury which caused a defective transmission at these points. He said that stimulation of any reflex arc left it momentarily depressed, so that any reflex mechanism was fatigued by excessive stimulation; that nervous shock was primary; that the fall of blood pressure was secondary (1) to the general relaxation of the body, (2) to haemorrhage and exhaustion. Bandaging the limbs, pressure upon the abdomen, administration of oxygen, and transfusion of

[5] *American Journal of Physiology*, 1907-8, p 405.
[6] *Journal of the American Medical Association*, January 8th, 1909.
[7] Acapnia and Shock, by Yandell Henderson, *American Journal of Physiology*, February, 1908; February and April, 1909; and later papers.
[8] *American Gynaecological Society's Transactions*, 1908.
[9] *Proc. Amer. Phys. Soc.*, 1909, p. 30.
[10] On the Significance of Carbon Dioxide for the Heart Beat, by Jerusalem and E. H. Starling, *Journ. of Phys.*, vol. xl, p. 279.

saline was the appropriate treatment, the object being to maintain the circulation, which would allow the synapses to recover.

Dr. DAVID LAMB (Glasgow) said that his experience of the treatment of shock corroborated Mr. Rowell's remarks. Undoubtedly when shock had occurred free saline intravenous transfusion with head and trunk lowered was amongst the most effective remedial measures at command. In ordinary circumstances two pints were used, but in one case—apparently moribund—the introduction of five pints of saline into a vein was followed by a marvellous result.

Professor WESLEY MILLS laid stress on the dreadful misery as well as the danger of shock. Starvation and purgation were not necessary in all cases, and might be injurious. It was very important to keep the patient warm.

DISCUSSION ON THE PRESENT POSITION AND LIMITATIONS OF SPINAL ANAESTHESIA.

OPENING PAPERS.

I.—J. BLUMFELD, M.D.Cantab.,
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THERE are some authorities who believe that little profit can come from discussing spinal analgesia at its present stage of development. The Council of this Section have, however, and I think wisely, decided otherwise. It seems to me that it is a good thing for us to try and settle by collective experience where the matter now stands. We shall be in no way attempting to declare that the future may not entirely upset our present position, but we shall certainly provide valuable information if we can arrive at some sort of general opinion as to exactly in what cases and under what conditions spinal analgesia is to be recommended, or to be objected to, at the present time. There are, perhaps, some who still maintain that it should never be used if a general anaesthetic is available; there are certainly others who think that there are many cases in which it is to be chosen in preference to general anaesthesia when either of the two can equally well be had.

The great advances that have been made since the method was first introduced over ten years ago—advances chiefly depending upon the abandonment of cocaine in favour of stovaine and novocain and tropacocaine—are in themselves enough to warn us not to regard the present position of spinal analgesia as necessarily or even probably final. At the same time we wish to know first what that present position is as regards safety, convenience, certainty, etc, in comparison with general anaesthesia, and particularly we want to know when, if ever, we ought to recommend spinal analgesia in preference to any form of general anaesthesia.

In order to provoke discussion, and to draw from those of greater experience in the matter than myself the results of their investigations, I shall not hesitate to make statements more dogmatic than my knowledge warrants, nor to lay down conclusions which later speakers will probably dissent from and very likely upset. Without further apology, therefore, I propose to consider spinal anaesthesia under two aspects—first, as a routine general anaesthetic, and, secondly, as the anaesthetic of choice under certain circumstances. And I may say at once that I propose to try and show with regard to the first position that we are not justified in adopting spinal anaesthesia as a routine anaesthetic; and, secondly, that there are certain, though few, conditions under which it appears to be the best method we have at our disposal.

Now, with regard to the routine use of such a method as spinal analgesia, we must first face the broad problem of whether or not it is desirable that the patient should be conscious during the performance of an operation. Obviously, if any one took the view that such consciousness was always and wholly undesirable, except in very minor surgery, he would under no circumstances admit spinal analgesia. Such an extreme view is hardly tenable when we bear in mind the common case of operations upon the eye. Here consciousness is the rule, and the surgeon is able to be considerably helped by the voluntary aid of the patient in moving the eye. Yet we must remember that even in eye cases it often happens that from the general mental temperament of the patient the surgeon prefers unconsciousness, and has a general anaesthetic administered. There are not many other operations during which the patient, if conscious, can voluntarily assist the surgeon, even if he were not paralysed by the analgesic, and this advantage of spinal analgesia therefore does not often enter into the question.

On the other hand, there are many cases in which the patient, if feeling any pain or queer sensation or imagining pain, may considerably interfere with the surgeon's convenience. Moreover, we have to consider something besides the immediate inconvenience that may result from the patient's consciousness. We have to take into consideration the general effect upon his nervous system. This is in many cases, I am certain, a most important matter. That this should be the case is easily understood by any one who has studied Freud's analytical diagnosis of hysteria and has realized the important part which fear, particularly in early life, plays in such conditions. In many cases the necessary stringing up, so to speak, of the patient, the nervous tension under which he forces himself to obey instructions quietly, the intense and subdued apprehension under which he labours from beginning to end of the ordeal—these things, even if he is spared all actual pain, are enough in many cases very seriously to derange a patient's condition of nervous equilibrium.

The important effect that may be produced by fear has recently been shown in a way perhaps more convincing than ever before. Crile has shown that actual morphological changes may be produced in cortical cells by the action of the emotion of fear alone, and some of those here no doubt saw the illustrative drawings yesterday, and heard Dr. Crile's remarks upon the matter then. Several of those remarks bore very pertinently upon that side of the question of spinal analgesia with which we are now dealing—namely, the disadvantages of consciousness; for Dr. Crile, in discussing shock, showed how large a psychical side there was in the production of shock; and physiologists who followed him showed, too, that the true seat of origin of shock is in the nervous system, the vascular condition being secondary. Now, this being so, we cannot hope to prevent shock by merely cutting off peripheral impulses; shock must be prevented also from above. The psychical factor in its causation must also be eliminated, and for this purpose we must have unconsciousness—that is, general anaesthesia. The importance of the psychical factor varies immensely with different individuals, it is true, and thus it is that spinal analgesia may sometimes be perfectly successful for an operation which, in a more susceptible, sensitive kind of individual, will only be performed quietly under the influence of a general anaesthetic.

I may say, apropos of this matter, that one case afforded me valuable evidence of the reality of these considerations of the psychical side of the question. It was valuable because the patient, a medical man, was in no sense a nervous individual, and he was anxious to have his operation—a rectal one—performed under spinal analgesia. This was done, and he felt no pain, and yet he is emphatic that nothing would induce him to undergo the experience again. He would rather, he declares, be sick for a couple of days after chloroform. The amount of control that was required to keep quite still and to ignore the ideas suggested by the moving of instruments and the necessary movements on the part of assistants, etc., and the absolute stillness required of him afterwards for fear of starting headache, made the experience an intolerable one.

If such is the case with a normal individual, we can realize what it must be with one by nature nervous or apprehensive, and we can easily decide how important it must be to select for spinal analgesia only such persons as are suitable from this point of view. In the case of quite small children their rapid forgetfulness may make this aspect of the matter unimportant, but in the case of children of about 8 years and upwards I am certain that the terror which I have sometimes seen them exhibit makes the use of spinal analgesia in many cases highly objectionable, even if they were spared all physical pain. Pain may be mental as well as physical, and the effects of the former kind, which cannot be avoided by spinal

analgesia, may be more far-reaching and undesirable than any purely physical torment. This is an aspect of the matter which I do not believe is sufficiently borne in mind, and one from which the use of spinal analgesia has the appearance of a retrograde movement when compared with the peaceful oblivion procured by the proper use of general anaesthetics.

From the same point of view the abilities of some surgeons are prejudiced by their patient's consciousness. In the old days a cool callousness was required on the part of the operator which is not called for during general anaesthesia, and there are some surgeons who cannot entirely disregard the moanings or complaints of a patient who momentarily experiences discomfort or pain during an operation under spinal analgesia. These interruptions interfere with his calm, and require on the surgeon's part an amount of indifference to which some refuse or are temperamentally incapable of subjecting themselves. On the other side of the argument—upon the advantages or disadvantages of consciousness—we must reckon with the fact that a certain number of patients dread more than anything else the loss of consciousness. These would obviously be persons in whose cases spinal analgesia should be chosen so far as this point of view is concerned.

Any anaesthetic which is to be used in a routine fashion must not only be certain to produce a requisite anaesthesia, but must also be so safe that the risk to life is at any rate only to be reckoned as one in some thousands. It should, in fact, be such that when used for healthy persons not undergoing very severe operations, the risk may be said to be negligible. That may fairly be stated to be the position of the general anaesthetics in competent hands. Now, it is obvious, I think, from the general experience that if spinal analgesia were used in a routine way for all operations to which it is applicable at all, the risk to life would be very much greater than this. Indeed, Professor Bier himself a year ago stated that a fatality of 1 to 4 in 500 was to be looked for. In the first place it is certain from the recorded cases that occasionally the injection into the spinal theca of what is ordinarily considered a proper dose of stovaine has produced a rapidly fatal effect. It is quite true that in several of the fatal cases recorded the condition of the patients was precarious before the puncture, but in others it is expressly stated that the condition was good, and that there was no operative procedure to be blamed for the collapse. In others, again, operation had not begun. As regards certainty in producing anaesthesia the spinal method at present leaves a good deal to be desired. For various reasons there are failures to an extent variously estimated at from 2 to 7 per cent. Some of these failures are no doubt due to faulty technique, and may be regarded as probably to be obviated in the future. In others it is found impossible to enter the spinal theca—this may occur owing to unusual obesity on the part of the patient or anatomical peculiarity of the spine. In other cases, again, cerebro-spinal fluid escapes, the theca has evidently been entered, the dose is injected, and yet there is no anaesthesia. Presumably some failures of this kind are due to the stovaine being inert, probably from not being sufficiently fresh. I had one such case in which this explanation would not hold. However occurring, these failures have seriously to be reckoned with in any comparison between spinal and general anaesthesia, for by the latter method there is, of course, in competent hands practically no such thing as inability to procure anaesthesia. Again, in cases under spinal analgesia we are sometimes disconcerted by the fact that anaesthesia is perfect up to a point and then fails. For instance, in an appendix operation the abdomen had been opened with perfect comfort on the part of the patient, but the manipulation necessary to free a firmly adherent, deeply-seated appendix gave rise to so much sickening feeling and such violent hiccoughing that I was obliged to give some chloroform throughout the rest of the operation. It is necessities of this kind, not at all uncommon where operations involving dragging are concerned, that go to prevent my regarding spinal analgesia as a reliable routine method.

The effect of spinal analgesia in minimizing shock by cutting off peripheral impulses will probably prove its great claim to utility in the future. There is no reason why this valuable effect should not be employed in conjunction with general anaesthesia, and in fact this has already been done, although not always by original intention. The extremely small amounts of general anaesthetic that need be administered to a patient who has been injected with stovaine reduce any risk due to the general anaesthetic to a minimum. Enough only need be given to ensure absence of all consciousness, and it seems to me that by this combination of spinal analgesia with unconsciousness we ought to be able to make anaesthesia even in severe operations as safe as is chloroform administration in an ordinary case of midwifery. At present this point has not been reached. The danger has not yet been eliminated from doses of stovaine, etc., sufficient to ensure perfect abdominal calm. The work of Mr. Tyrrell Gray, which seeks absolutely to localize the effect of the injected drug, seems to me of the greatest promise in this respect. If we could by injecting some spinal analgesic cut off all peripheral impulses and paralyse the abdominal muscles, at the same time getting no absorption of the drug into the general circulation, and then ensure absence of all pain and consciousness by minute quantities of chloroform, we should have an ideal condition both from the patient's and from the surgeon's point of view. At present an ideal condition, from the surgeon's point of view, is only obtained, where severe abdominal operations are concerned, at considerable risk, and usually, in my experience, with some, if not considerable, discomfort to the patient. The gain to the surgeon's convenience of the absolute flaccidity obtained by spinal analgesia cannot be disputed. It is a flaccidity which we cannot imitate with general anaesthetics, for it is a flaccidity in which the recti muscles resemble more those of the corpse than of the living subject. They offer absolutely no resistance to the manipulations of the surgeon, and give him freedom to the extent which we cannot get with general anaesthesia, with which, of course, we cannot paralyse the recti unless we paralyse the respiratory centre too, an effect which we are not overanxious to produce. Now this condition, so delightful to the operator, is only obtained at the price of other disadvantages. First, there is absorption of the stovaine into the general circulation to an extent which produces dangerous depression, and has several times proved fatal; and, secondly, in the most favourable cases there is a period of retching or vomiting usually about fifteen minutes after the injection. This is variously explained as being due to paralysis of the lower intercostal muscles, with dilatation of the stomach and overaction of the diaphragm, or to cerebral anaemia due to the filling of the vessels of the splanchnic area by reason of their dilatation in conjunction with relaxation of the abdominal muscles. It is true that this period of circulatory depression and retching or vomiting lasts generally only a very little time. But it has not always been so, and when remedial measures are necessary we are debarred from the most effective of all—lowering of the patient's head—by the additional risk we should incur of causing the stovaine to gravitate to the bulb. It is true that some of the French surgeons say that in injections of caffeine and serum they have an absolute safeguard against serious effects from this condition of collapse. I have had no personal experience of these remedies, and shall be interested to hear if others can corroborate the statements of M. Tuffier in this respect.

When we come to consider conditions under which spinal analgesia is by some regarded as the method of choice, we are met by extraordinary differences of opinion. Taking, for example, the case of intestinal obstruction with frequent vomiting, we have here an example of a condition which many regard as particularly dangerous for general anaesthesia. Spinal analgesia was confidently looked to as a means of increased safety during operation under such circumstances, yet we find one observer who states that this is a condition under which he cannot recommend spinal analgesia, and he gives three fatal cases on which he bases his opinion. Recently another similar case has been reported in the JOURNAL of our Association.

Another class of case in which general anaesthesia has undoubted special dangers is that of diabetic patients undergoing amputation for gangrene. Here the mortality due to coma following general anaesthesia is undoubtedly high, and here it appears to me is a class of case in which spinal analgesia deserves the first consideration. The dose to be injected need not be so large as in abdominal cases; the risk of collapse from the spinal analgesic can therefore be reduced to a minimum, and

enough general anaesthesia for the patient's comfort can be supplied by the means of gas and oxygen, which is, so far as we know, free from harmful effects to the diabetic.

Cases of serious disease of the lungs—acute phthisis, for example, or advanced bronchitis—in which an operation is necessary, upon the lower limbs or perineal or genital regions, provide further examples of cases in which it appears to me spinal analgesia should be the method of choice. In cases of heart disease, on the other hand, I believe that the danger of general anaesthesia is commonly over-estimated, and certainly in the instances which have come under my own observation, I have never regretted the choice of a general anaesthetic in opposition to spinal analgesia. Cases of operation upon patients who are in an advanced stage of general peritonitis form another class in which there is often much to recommend the choice of spinal analgesia. These patients are already apathetic from the extent of their toxic poisoning, and there is little fear of shock from the psychical side; to cut off the peripheral causation of shock is therefore a rational proceeding, and there are cases in which a prolonged general anaesthesia does sometimes turn the scale against the patient's chance of recovery.

II.—W. J. McCARDIE, B.A., M.B., B.C.(Cantab.),
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[ABRIDGED.]

IN dealing with my subject I shall not consider the earliest series of cases in which cocaine was used, and my remarks will apply therefore to the results of the injection of eucaine, stovaine, tropacocaine, and novocain. Cocaine is the chloroform of local anaesthetics, and nowadays is practically unused for producing spinal analgesia. The facts and opinions expressed in the very large number of the abstracts of articles which I have consulted vary greatly and sometimes differ absolutely.

Let us compare the death-rate of inhalation anaesthesia and spinal analgesia respectively. I have collected 50 deaths ascribed to spinal analgesia. The association of some of them with the method has been disputed, but on the other hand has been upheld; 35 at least of them occurred under the most widely-used drug, stovaine.

The deaths under general (excluding nitrous oxide) anaesthesia in a total of 1,686,348 cases recorded in Europe numbered 518, or 1 in 3,255. I have also collected from more than forty observers 23,955 cases of spinal analgesia with 29 deaths, or 1 in 826. Strauss some time ago referred to 22,717 cases with 46 deaths; omitting 19 in which he thought the method was not responsible, the mortality was 1 in 2,524. Only this year Strauss said he had collected 30,000 cases, the deaths being 1 in 1,800. At another time he said that tropacocaine had a record of 7,059 cases with 5 deaths, or 1 in 1,411. Schwartz mentions 3,000 cases without a death, and Chiene 15,842 cases with 21 deaths, or 1 in 754, and remarked that only 3 seemed clearly due to the method. Chaput has stated that there has been 7,000 cases without a fatality, but his figures were contested by those who had reported deaths. Müller (1910) said he used spinal analgesia by preference, and had had over 2,000 cases without real trouble. The very latest figures are those given by Hochmeier and König, when speaking this year of the present position of spinal analgesia. They recently collected 2,400 cases from many clinics and hospitals, the deaths numbering 12, or 1 in 200. Four patients died of respiratory paralysis a short time after, or directly in connexion with, the injection. In 3 cases death was said to have occurred some hours after operation with signs of heart paralysis, 1 patient died of anuria, another of cerebral apoplexy ten minutes after injection. Purulent meningitis caused death in 3 cases. Hochmeier refers the large number of deaths to the fact that many of the patients were unfavourable subjects because of old age or already existing internal disease, but I think this is the class of case in which we should expect results of spinal analgesia to be distinctly better than those of inhalation anaesthesia. Hochmeier concludes that spinal analgesia should only be used when "Äther-rausch" and local analgesia will not suffice and there is marked contraindication to general anaesthesia.

The danger-rate in general anaesthesia (British Medical Association Report) is 153 in 23,423 cases, or 1 in 153. In 18,081 cases of spinal analgesia I found 107 danger cases, or 1 in 169. Chiene found 34 cases of grave collapse in 15,842 cases, or 1 in 466.

Failure is not always admitted by those who practise spinal analgesia; for example, Chaput said that he had had no failures for two years (he uses stovacocaine and gives scopolamine). I have not been able to find full and recent figures recorded by Tuffier in France, or Morton in U.S.A., both of whom have very extensively, the latter in 4,000 cases, used spinal analgesia.

Under failures I include failure to puncture, insufficient analgesia, no analgesia, and cases where inhalation anaesthesia had to be used, and have collected 11,745 cases where such information has been vouched, with 1,097 failures, equal 9.3 per cent. This proportion corresponds with the figures quite recently collected by Hochmeier and König, who reported 9 per cent. of failures in 2,400 cases.

Failure may occur even when injection is well carried out and there is apparently no defect in technique. Such failure is sometimes supposed to be due to idiosyncrasy. Failure, also, is said to be not uncommon in timid and nervous subjects, and not infrequently occurs where spinal analgesia is specially indicated, as I have seen several times. It is not rare that spinal disease—for example, osteomalacia, spinal deformity, or obesity prevents puncture. Meissner found that in 15 out of 600 cases the 2 latter causes operated. Connected with failure is the very occasionally late appearance of analgesia—for example, after three-quarters of an hour (Höllander), and its disappearance before the end of operation. Rarely, also, the analgesia may be unilateral. The large percentage of failures indicates that spinal analgesia should be carried out by an expert, and, in my opinion, by the anaesthetist. Jonnesco claims absolute safety for his method, and does not mention the word failure. The results of 7 of his cases recorded in England and America were as follow: 1 good, 1 unsatisfactory, 3 failures, and 2 almost died. Of 7 high analgesias demonstrated by Jonnesco in America, 4 resulted unfortunately, and 2 nearly died.

Our results at the General Hospital so far have not been encouraging. I have notes of 21 cases with 12 failures, 3 collapses, 2 deaths. The collapses and deaths occurred in patients in whom inhalation anaesthesia was feared, but both collapsed patients successfully took chloroform later on. One death and two collapses occurred with Jonnesco's method.

There is little mention of psychic disturbance in spinal analgesia. It is only reasonable to suppose that patients should have their cerebral activity stimulated under the unusual conditions of operation, and unless analgesia be absolute and operation straightforward psychic insult must necessarily be present.

What is the psychic effect of failure to puncture or to obtain complete analgesia? We must remember that the percentage of failures is large and that several attempts at puncture are sometimes made. I have heard of as many as seven. The psychic damage cannot be measured in terms as can shock or collapse, and psychic after-effect may last for months after the cause has operated.

Nervous and timid subjects are said to be refractory to spinal analgesia—that is, the standard dose does not produce the standard effect. This must in many cases be due to the fact that patients' psychic activity is greatly stimulated. We know that nervous patients often need much more than do ordinary patients of a general anaesthetic; on the other hand, psychic activity in patients who are very ill is fortunately greatly lessened, and spinal analgesia seems to be particularly appropriate in some of these cases. For large and long operations the present tendency is to combine scopolamine-morphine with spinal analgesia, and possibly to add a little ether or chloroform. Are we to regard this empirical and complicated combination of drugs, whose action after injection cannot be controlled, as generally better for the surgeon and patient than is narcosis? Krönig and Gauss, for example, use scopolamine-morphine with spinal injection in gynaecological operations because of the psychic effect produced, especially in the Trendelenburg posture. Holzbach says that in excited or stout patients he uses the same combination because of the complaints of patients that they cannot sleep any more and that they hear everything, and thus the effects of the

best analgesia may be thwarted. He produced in nearly three-quarters of his cases a deep sleep whose snoring is a source of satisfaction! So important is the psychic factor.

In gynaecology the authors just mentioned use spinal analgesia for the larger operations, but prefer general anaesthesia for the shorter ones. Retention of consciousness during large operations cannot, I think, be looked upon with indifference, and the long-continued Trendelenburg position is unpleasant from the first, and towards the end of the operation becomes almost unendurable.

From the surgeon's point of view it has been said that "if successful, the method fulfils all the surgeon's needs except that of certainty; there is absolute flaccidity of the muscles, anaemia of the parts, little bleeding, and little or no protrusion of the intestine in abdominal work." There is practically no mention in literature of anaemia of the tissues. Gray, however, says that the intestines are anaemic. With full analgesia relaxation of the abdominal wall is often absolute, which is of great advantage in deep abdominal work. Gray has had brilliant results during operation for intussusception in children.

The general opinion appears to be that children under 14 are not suitable subjects for spinal analgesia, but Gray and one or two others have found them to be ideal.

For obstetric work Westermark says puncture is more difficult because of the difficulty pregnant women have of bending their back. Uterine contractions are not interfered with while the cervix and perineum are relaxed. Epidural injection has been successfully used by Stoeckel in 111 out of 141 obstetric cases.

According to Neugebauer, in rectal surgery spinal analgesia is of great advantage, because the sphincters relax so much that the anus and region above are open wide for visual inspection, and he suggests spinal analgesia before narcosis and for diagnostic purposes.

It has been claimed that spinal analgesia greatly lessens the ratio of lung troubles after operation. In inhalation anaesthesia this ratio has been estimated at 2 per cent. (with 1 per cent. of deaths); another estimate is 0.32 per cent. Kümmel (1909) said that since he had used scopolamine-morphine the pneumonia rate had fallen from 2.5 per cent. to 0.61 per cent. In gynaecological laparotomies Krönig and Gauss say that with inhalation anaesthesia there are 7 per cent. bronchopneumonias and a death-rate of 2 to 3 per cent. They found, however, that in 600 laparotomies under spinal analgesia there was no after-pneumonia (they added scopolamine-morphine). Holzbach always operates under spinal analgesia on women ill with bronchitis, even if they have very bad symptoms, and has found no harm result. Hochmeier and König found that lung troubles in 2,400 cases of spinal analgesia numbered 1.7 per cent., and said that the danger of lung troubles was equally as great as for narcosis. I think it is either König or Kümmel who truly says that "thanks to the modern method of administration of scopolamine, post-operative pneumonia has become a dream, because there is no salivation and there are no tracheal râles, while vomiting is rarely observed."

Certainly, with our recent methods of inhalation anaesthesia, and general precautions, lung troubles are seldom seen. The after-effect is said to be much less than that after general anaesthesia. Gray says there is no comparison between the two methods. Other observers record vomiting lasting for several days and sometimes almost uncontrollable.

The most common after-effect is headache, which may be very severe and last for several days or longer. This is very rarely experienced after inhalation anaesthesia, but is found in about one-third to one-half of the cases of spinal analgesia. Deetz reported headache in 50 per cent. of his cases; it was very severe in 8, in 1 case lasted for two weeks, and in another for at least six weeks. Becker reported a case of headache and vertigo lasting for three weeks. Hochmeier mentions 1 case which lasted for six months.

The number of severe and dangerous after-effects on the side of the nervous system is astonishing. Prolonged rachialgia may occur, for example, in 30 per cent. of cases (Feliziani), pain in the limbs for a week or ten days, or even two months. The irritation or damage to the central nervous system may proceed further, as shown by meningismus, paraesthesia, and more or less extensive paralysis, which may persist, and at times by fatal meningitis. Leguen reported 4 cases (in 250) of intense meningeal reaction lasting from four to six days. Many cases of paresis and paralysis of the limbs, bladder, and rectum are recorded, but space forbids me to mention them in detail. Paralysis of the abducent nerves is not infrequent. Vossius collected 33 cases, 1 of which lasted for six months; the percentage of these cases has been given as 2 per cent. Paralyses of the facial, hypoglossal, external cutaneous nerves, and of the shoulder muscles have also been recorded. Trophic disturbances may occur; retention of urine seems to be not uncommon, and may be prolonged.

With regard to dosage. Various and frequently severe symptoms during anaesthesia, and especially certain dangerous and persistent after-effects and deaths, show the difficulty of accurate adjustment of dosage to individual cases. Undoubtedly some of the deaths have been due to over-dosage. The standard dose is sometimes an overdose and sometimes insufficient. Hardouin collected 15 fatalities under stovaine, and in none of them was the dose over 0.07 grain; thus a standard dose proved fatal. Localization of dose, not an easy thing, cannot always be relied upon to prevent danger. The dose is empirical, and no allowance can be made for idiosyncrasy or for an error of judgement in summing up the condition of the patient.

It seems to me that, generally speaking, spinal analgesia is indicated where the toxic effect of general anaesthesia, especially if prolonged, is feared. This is particularly the case in old people, and in cases of acute disease. I would particularly urge its advantages in the case of diabetics where ether is usually impossible and chloroform is peculiarly dangerous because of its remote action. In bad cases—for example, cachexia, shock, and diabetes—there is what I call a "critical point" when the choice of a method of anaesthesia will often decide the issue of the case. In these conditions psychic sensibility fortunately is lessened, and the immediate or remote continuing toxic effect of inhalation anaesthesia may prove too much for the patient, so it is better that he should risk the immediately probably slighter toxic effect and more troublesome after-effect due to local nervous disturbance, and the 9 per cent. failure to produce analgesia, and that spinal analgesia be chosen, always providing operation is to be below the umbilicus and local anaesthesia is impossible. Apart from these cases, if the method *must* be used it should be reserved, as Tuffier recommends, for cases in which success is fairly certain and local anaesthesia impracticable, and, I would add, in which the operation is definite and no emergency is likely to arise.

From an extensive review of all the literature available to me on the subject, I conclude that spinal analgesia is retrogressing in favour, and is generally only used when there are marked contraindications to inhalation anaesthesia and local anaesthesia is not possible. Only a few surgeons who have had special experience of the method in a large number of cases of the same kind use it largely. In Germany it is abandoned by 50 per cent. of the surgeons who have employed it. The proportion of deaths, as one would expect from the conditions, is greater than in inhalation anaesthesia. The immediate dangers are at least as great. The after-effects are not uncommonly most severe, affect the nervous system, and on the average at least as frequent as those following inhalation anaesthesia. Many of them are most persistent and disastrous, though I must say that the English results are much better in this respect than the foreign. In spinal analgesia the chief after-effects are headache, backache, and raised temperature; in inhalation anaesthesia vomiting.

The percentage of failures in the former is very high. An excessive dose, whether absolute or relative, as in the case of idiosyncrasy, is more immediately and hopelessly fatal than is one after ether or chloroform, because it cannot be antagonized by mechanical eliminative means.

In the treatment of emergencies from spinal analgesia, one does wrong whether one sets up or inverts the patient; in the one case he may die of syncope, and in the other of poisoning.

Keen says that the ideal anaesthesia will abolish pain by abolishing consciousness, but without danger to life. Spinal analgesia does not fulfil either of these conditions. I place spinal analgesia as a method of preventing pain between inhalation and local anaesthesia. Generally

speaking, I think it should only be used in certain selected and mostly critical cases.

III.—E. Canny Ryall, F.R.C.S.I.

Mr. Canny Ryall said that, as the probation period of spinal analgesia was now over, it was justifiable to lay down distinct indication and contraindications to its use. At present spinal analgesia should be restricted to: (1) Cases for which local or venous anaesthesia are inadequate. (2) Cases in which there are weighty motives for not employing inhalation narcosis, or where spinal analgesia is especially indicated.

It might thus be used in the following circumstances: (1) Operations involving the danger of great shock. (2) Severe injuries associated with shock. (3) Urgent operations. (4) Operations upon the head and neck. (He did not agree with Dr. Blumfeld that the use of spinal analgesia for operations above the umbilicus was too dangerous and too uncertain to justify its use.) (5) Abdominal operations. (The complete muscular relaxation, the elimination of shock, and the diminished liability to post-operative pneumonia were some of the advantages associated with this form of analgesia.) (6) For prostatectomies, since for old and weak people this method had an undoubted advantage over general anaesthesia. The enucleation was rendered much easier owing to the complete muscular relaxation. The dangers attending severe vomiting were avoided and shock was reduced to a minimum. (7) For rectal surgery.

Some diseases, if present, made the avoidance of general narcosis desirable, such as: (*a*) Diseases of the vascular system — acute pericarditis, severe valvular diseases, arterio-sclerosis, etc.; (*b*) diseases of the lungs — pneumonia, bronchitis, phthisis, etc.; (*c*) renal disease.

As a rule alcoholics were exceedingly hard to anaesthetize, requiring excessive quantities of ether or chloroform to obtain complete muscular relaxation. They breathed badly, and were more or less troublesome all through the operation. These subjects bore spinal analgesia very well. For them this method was particularly indicated when treating severe fractures or dislocations.

According to Continental gynaecologists, the employment of this method of anaesthesia had markedly improved the operative results. It was particularly indicated in total abdominal hysterectomy for fibromata and carcinomata.

There was a certain class of people for whom the idea of complete unconsciousness was the most terrifying part of the operation. For such persons spinal anaesthesia was especial useful.

Age offered no contraindication to spinal analgesia; on the contrary, the utility of the method at both extremes of life had frequently been demonstrated.

The contraindications to spinal analgesia were: (1) Operations which could be performed under local or venous analgesia. (2) Acute infective disease, as several deaths from suppurative meningitis had occurred, when severe infective diseases were present at the time the injection was given. (3) Suppurative processes in the neighbourhood of the proposed site of puncture. (4) Alterations in the vertebral column which might prevent the puncture succeeding. (5) Diseases of the central nervous system, especially tumours of the brain. There were strict contraindications, as several cases of sudden death had followed simple lumbar puncture with withdrawal of cerebro-spinal fluid from patients suffering from cerebral tumours. (6) Recent syphilis. (7) A high temperature. (8) If the patient could not rest in bed for twenty-four hours after operation spinal analgesia must on no account be attempted. (9) In hysterical or very nervous patients a subcutaneous injection of one or more doses of scopolamine often worked wonders.

The net conclusion drawn was that spinal analgesia had rendered most excellent service and had a future of rich promise. It would not displace other methods, neither would it die, but would remain and undoubtedly fill its proper place in surgery.

DISCUSSION.

Mr. J. T. J. Morrison (Birmingham) said he was a convinced supporter of spinal analgesia, as it had proved a valuable aid in his operative work. During the past three years he had dealt with more than four hundred cases without encountering any anxious incident or sequel. His experience was restricted to tropacocaine, which he greatly preferred to other agents, because he considered it the least toxic drug yet introduced for the purpose. As the procedure had still to make its way in this country and involved surgical technicalities, he chose to take the responsibility of administering the tropacocaine himself instead of leaving it to the anaesthetist. The operations he had performed on patients under spinal anaesthesia ranged from sequestrotomy of the sixth rib down to excision of an interphalangeal joint for hammer-toe; and included cholecystomy for gall stones, gastrostomy, nephro-lithotomy, nephropexy, laparotomy for intestinal obstruction and appendicitis, both acute and chronic, umbilical and other herniotomies, operations on the urinary bladder, rectal operations, and amputations through the thigh and below. Within the last annual series his cases at the Queen's Hospital, Birmingham, numbered 173. Analysis of this series showed that the extremes in point of age were a boy aged 10, on whom Bassini's operation was done for the cure of inguinal hernia, and a man aged 81, with vesical carcinoma, partial resection of the bladder being performed; both of these cases were successful in every respect. Four of the 173 patients required a general anaesthetic in addition—namely, (1) a man, aged 57, with double inguinal hernia (the sacs were large and very adherent, and the analgesia did not last out the operation); (2) a nurse, aged 37, with old adhesions of the knee-joint (this was a neurotic person); (3) a man, aged 39, with inguinal hernia (no analgesic reaction to tropacocaine seemed to be obtained); (4) a boy, aged 15, with inguinal hernia (a nervous lad, who was comforted with 5 minims of chloroform given on a mask by the house-surgeon, Mr. J. Adams). In several other cases analgesia was imperfect but sufficient for the purpose in hand. The chief complications met with in the series were faintness, headache, and vomiting. By giving strychnine under the skin before and sips of brandy and water during the operation, faintness was mitigated or prevented. When pronounced it was treated by lowering the head, and, very rarely, by injecting ether subcutaneously. Headache occurred in 34 cases—that is, about 20 per cent.; in some patients it was severe, and lasted several days. Eleven patients had subsequent vomiting, and 2 vomited on the table. One patient, suffering from necrosis of the femur, lost control over the contents of his rectum during operation, but he had no ill result afterwards. The level of the site of injection varied between the eleventh dorsal intraspinous space and the fourth lumbar.

Mr. Tyrrell Gray said that the indications for and limitations of spinal analgesia depended upon the principles upon which work was done. Physiological and physical laws prevailed in the body, and it was by a study of its physiological action that chloroform had been made so safe. The study of spinal analgesia must be carried out in a similar manner. The principal risks involved by its use were: (1) A spread of the paralysis; (2) absorption of the drug. A heavy solution was an advantage, as it enabled the effects to be more definitely localized. The method was of great value in diminishing shock, and was indicated when this condition was specially to be desired, and in vomiting, renal disease, disease of the lungs, and when muscular relaxation was desirable. The contraindications were the existence of spinal disease and cases in which a general anaesthetic formed no additional danger, or in which shock was not to be anticipated. A comparison of the relative safety was unfair until the subject had been studied scientifically.

DISCUSSION ON THE OPEN SYSTEM OF ETHER ADMINISTRATION.

OPENING PAPERS.

I.—H. Bellamy Gardner, M.R.C.S., L.R.C.P.Lond.

In offering some remarks upon the open system of ether administration I have to say that I am anxious that this anaesthetic should not, owing to the simplicity of the method, be used for unsuitable subjects.

In selecting ether as an anaesthetic we must make sure that the patient has a moderately good power of chest

expansion and is not suffering from any disease of the lung, for in persons with rigid chests or chronic pulmonary affections increased secretion of mucus in the trachea and bronchi may result in immediate bronchitis or pneumonia. General discredit will certainly follow its injudicious employment, and a most valuable addition to our resources will lose its proper place in the surgical practice of to-day.

To show how far enthusiasm for a novelty sometimes carries away our better judgement I will relate the following incident: An elderly emphysematous man with chronic bronchitis was given ether by the open system for the excision of a growth in the bowel. A severe attack of pneumonia supervened, from which he gradually recovered. At an interval of only six weeks a further operation for a faecal fistula was required, and I was then, for the first time, called to anaesthetize him. The surgeon in this instance, being the ether enthusiast, suggested open ether as a suitable anaesthetic, though on entering the patient's room respiratory râles in the old man's chest were audible before arriving at his bedside. He took chloroform quite comfortably, and without subsequent pulmonary complication.

To prevent the secretion of saliva and mucus in appreciable quantities, the patient for whom ether has been selected should receive a hypodermic injection of $\frac{1}{120}$ grain of sulphate of atropine half an hour before the administration; $\frac{1}{4}$ grain of acetate of morphine may be added in very athletic, neurotic or alcoholic subjects. Atropine has several other valuable qualities in connexion with operations, for I find that it maintains the body temperature by preventing sweating, and assists in obtunding the effects of surgical shock. A small aluminium surgical mouth-prop is first inserted between the side teeth. A light circular roll of gauze is then laid upon the patient's face to prevent waste of the heavy ether vapour. The wire mask fitted with twelve layers of gauze is rested upon it. The administrator now directs the patient to breathe out gently through his mouth, and by pouring out a small stream of ether and encouraging remarks, talks the patient off to sleep. Consciousness is clouded much earlier than with chloroform, and the ether vapour being too weak to be pungent is readily inhaled without cough or holding of the breath.

The gauze is gradually wetted all over the mask to attain the third stage of anaesthesia; but after this only the lower section opposite to the mouth need be kept moist.

There is rarely any struggling. If stertorous breathing arise which is not relieved by pushing the lower jaw forward, the mouth should be opened wide for a moment while a clip is inserted one-third of an inch from the tip of the tongue. This is then held gently forward by the thumb loop and the mask replaced over it.

A good deal more faith and less ether than is generally employed attain the best results, and these can easily be acquired, because there is no tendency to the sudden occurrence of sickness, as with chloroform when the anaesthesia has been allowed to become too light. If the air passages be kept really free from obstruction, dilatation of the pupil and laboured breathing are signs of too profound a degree of narcosis.

The much greater obtundent quality of ether in preventing the transmission of surgical stimuli results in the absence of "crowing breathing," that is to say, partial reflex laryngeal spasm, during the dilatation of orifices or traction on sensitive structures, nor are these manœuvres followed by the cold sweat of shock which under other anaesthetics is a marked concomitant.

The abdominal muscles are easily relaxed under open ether and remain so, without either reflex rigidity or unduly ample respiratory excursion, but the latter entirely depends upon the administrator's skill in keeping a free oral airway without the slightest mechanical anoxaemic factor. The patient should always be warmly clad in double blankets, but there is no object in warming the atmosphere unduly. If mucous râles become markedly audible or duskiness occur, the ether should be abandoned for chloroform, given at first in extremely small amount, because of the obstruction such mucus may cause to its proper elimination.

After ether the patient may and should be propped up in bed for recovery almost in the sitting position, and directly he wakes encouraged verbally to cough and clear his air passages, so that stagnant mucus may not cause subsequent dyspnoea or congestion.

The as yet somewhat imperfectly appreciated advantages of the open system consist in its simplicity and extreme safety during the operation, the absence of shock, and, more important still, the almost complete immunity from after-sickness of any kind. In my own experience whole batches of a dozen patients in series have recovered without vomiting at all. This valuable quality renders it the proper anaesthetic for patients with septic conditions and children who are liable to acidosis and severe post-chloroform sickness.

Dr. Crile's glass funnel and nasal tubing for the continuation of ether administration during mouth operations extends its use to many other cases, and old people with feeble circulation can now be safely tided through these ordeals.

The operation for extirpation of goitre has certainly lost half its dangers since this method has come into use, for the disturbance of the vital structures in the neck has barely any effect upon the breathing under ether by the open system; neither have I observed that moderate haemorrhage nor a raised position of the head produce any variation from the level of safety. I have recently met with a patient with mitral valvular regurgitation, who, requiring the removal of a number of exostosed teeth, developed a most alarming syncope on two occasions under nitrous oxide and oxygen in the dentist's chair. On a third occasion six difficult extractions were accomplished in the upright posture under open ether without faintness or subsequent vomiting.

I see little advance from the use of the bag inhalers in the employment of close-fitting rims or facepieces, or, in fact, of any other apparatus than a wire frame and gauze, because they produce varying degrees of negative pressure in the chest during respiration either by their narrow calibre or other mechanical limitation of air supply, and though I greatly admire their ingenuity, I do not regard such appliances as providing the true open system of ether administration at all.

II.—A. L. FLEMMING, M.R.C.S., L.R.C.P.,

Senior Honorary Anaesthetist, Bristol Royal Infirmary.

I SHOULD be glad if, when discussing Dr. Bellamy Gardner's remarks, members present would express their views upon the following points, which have reference to the phenomena met with during the administration of ether by the open system.

Judging from clinical evidence, at any rate, one can hardly doubt that the primary effect of ether is its stimulating action on the respiratory machine; and it seems to me that this action of ether, if properly used, affords us a valuable means of controlling the condition of our patient, but if abused may lead to over-stimulation and exhaustion.

This control is well illustrated in the administration of ether and chloroform with the drugs not previously mixed, but delivered from separate drop bottles, one containing ether, the other chloroform; so that as occasion demands any variation may be made in their respective proportions. Under these circumstances, if the breathing becomes shallow and the pulse weak, an increase in the proportion of the ether given is followed immediately by deeper respirations, and after a short interval by improvement in the pulse. In fact, we seem to have in ether a means of carrying out a sort of artificial respiration with its secondary beneficial effect upon the circulation.

Patients who are anaesthetized by this method show a remarkable absence of any tendency to become faint or to show signs of shock. I would suggest that possibly this satisfactory condition may be due to the mechanical effect upon the heart and great vessels of the increased respiratory movements.

My apology for making mention of ether and chloroform, given from separate bottles, is that it was while using this method some years ago—in 1896—that I first realized how easily anaesthesia could be maintained by open ether, and I am convinced that if more anaesthetists were to adopt this two-bottle system, the result would be a more general use of ether given on the open mask.

I should like to hear views as to the risks of over-stimulation by the open ether method, and as to the best means by which we may avoid exhausting the respiratory apparatus.

There is a complication which, although well recognized, is, I think, so often overlooked, that a reference to it to-day may not be out of place.

I refer to the reflex circulatory and respiratory depression consequent upon the accumulation of mucus in the larynx and trachea; as this phenomenon very often occurs without any obvious cyanosis, the true cause of the patient's faint condition is apt to be overlooked. The most satisfactory way of dealing with this condition seems to be to allow, or even encourage, the patient to cough. I have mentioned this complication because it is apt to occur during ether anaesthesia, and I venture to think that its importance has not been duly emphasized in some of our textbooks.

My third point is one which I approach with considerable diffidence, seeing that my experience is contrary to the ordinary textbook and monograph teachings. I will therefore not express views, but will rest content with relating a few facts as I have observed them.

In many instances I have been surprised by the small amount of bleeding occurring during operations performed under open ether. I will especially mention such operations as those for simple, malignant, and exophthalmic goitre and removal of cerebral tumours, and other operations upon the brain.

In this connexion I would remind you that the blood pressure is not raised above normal by ether given by this open method, provided there is no accompanying cyanosis, and this fact may explain the absence of excessive bleeding in the cases I have quoted. In order to obtain such a satisfactory anaesthesia, it is absolutely necessary to keep the air passage dry and to avoid cyanosis.

If there are any gentlemen here who use open ether in such cases as goitre or cerebral operations, will they kindly tell us what their experience has been as regards haemorrhage?

DISCUSSION.

Dr. G. Rowell (London) thought the method safe and the resulting sleep in many cases almost indistinguishable from the best chloroform narcosis. He did not agree that the blood pressure was not raised: it was raised very constantly but very slightly, and was remarkably free from fluctuation. He had only had to change from open ether twice during some years. He had not found that open ether gave rise to pulmonary after-effects if the patient were guarded from chill, and he considered that the freedom of the method from after-effects was one of its great advantages.

Mr. E. J. Quirk (London) agreed with Mr. Gardner that open ether was a good anaesthetic and that it prevented shock. On the other hand, the previous injection of morphine and atropine seemed to be absolutely necessary. The induction period was very long, and there was a large amount of ether vapour in the room, to the great inconvenience of the operators.

Mr. H. J. Patterson (London), speaking of open ether from a surgeon's point of view, thought it was an excellent anaesthetic, and wondered that it had not been introduced before. He did not agree that ether was not suitable for mouth operation or for children under 10, and believed that it was an ideal anaesthetic for alcoholics. The advantages of open ether were its safety and its freedom from after-effects. The anaesthesia was equal to that of chloroform, and was especially suitable for goitres.

Mr. Alexander Brownlee (Cardiff) considered that the open ether continuous drop method was the best routine practice; much of its success lay in the dropping being continuous and not intermittent. Ether had been given by open methods for many years past by Silk's inhalers and various modifications of these; but, although they were a great advance on the old closed method, the fact that they were intermittent methods was against them. The continuous drop method was that used by the brothers Mayo of America in their surgical clinic, and their anaesthetist recorded 4,000 administrations "without a death directly due to the anaesthetic," which was rather an elastic term. In children over 10 years of age, in women, and in men of average build and temperate habits, the open method had no equal. He could not understand how anaesthetists could use and surgeons tolerate the old closed method if acquainted with the alternative. In short operations where anaesthesia could be induced quickly by gas or ethyl chloride, there might still be some use for the closed method, but its sphere was limited. It was dirty and unphysiological, while the open method was the reverse, and certainly lessened shock. Yet the method had disadvantages, these being as follows: (1) It was unsatisfactory in young children unless a fair amount of air was given with it. The speaker had seen some children almost asphyxiated with it through failure to pay attention to the necessity of plenty of air. (2) It presented no advantages in operations about the mouth; and although it was true it might be given to patients sitting in a dental chair, the anaesthesia did not last long enough for the extraction of twenty to twenty-five teeth by an average dentist. (3) It was unsatisfactory in dealing with strong, alcoholic men, unless preceded by an injection of morphine and atropine. (4) A larger quantity of ether was used, although practice with the method enabled the administrator to lessen the wastage.

Mr. G. A. H. Barton (London) said that he had used the method for some time, but thought it had some practical drawbacks—namely, the amount of ether used and in the atmosphere of the room. He did not agree that the method made induction of anaesthesia easy, and had experienced great difficulty with muscular subjects and alcoholics.

Mr. Stewart V. Stock (Bristol) thought that for the maintenance of anaesthesia by the use of open ether it was best to use a Murray mask covered with a single layer of domette. This mask should be a close fit to the face to prevent air reaching the patient except through the domette covering. No face-pad was required. The advantages were simplicity and the comparative absence of frost on the mask. This latter advantage was of importance, as it prevented too great a cooling of the inspired mixture of air and ether vapour. A very cold vapour would not only help to lower the body temperature, but also help in irritating the respiratory tract. For the first induction of anaesthesia where the open ether method was to be used, it was best to use ethyl chloride and ether; 1 c.cm. of the former was sufficient. Directly consciousness was lost a small stream of air should be admitted to the Clover by means of a valve in the angle-piece connecting the inhaler to its bag, and this admission of air should be continued as long as the Clover was used; it prevented cyanosis, and also to a very large extent it abolished any secretion. Should ethyl chloride and ether be contraindicated, anaesthesia should be induced by the "two-bottle" method—namely, the domette-covered mask and two bottles, one containing chloroform, the other ether. Chloroform was gradually dropped on the mask, which was held ½ in. clear of the face. Ether was also added from the second bottle, and as consciousness disappeared the chloroform was discontinued, ether only being used, the mask now being brought into close contact with the face and open ether proceeded with. The great aim both of induction and maintenance of anaesthesia should be the avoidance of secretion. Secretion (apart from cyanosis) indicated irritation of the respiratory tract; if it was not set up, respiratory complications due to the anaesthetic would not follow. As too strong an anaesthetic vapour produced this secretion, it would be well to lay down a definite strength for the ether vapour, as had been done in the case of chloroform. With this object in view, the speaker had experimented with ether vapour of a strength varying from 20 per cent. to 30 per cent., supplied to the patient on the plenum principle through a perforated tube lying immediately under the domette covering of the Murray mask, the perforations being so arranged as to be immediately opposite the mouth and nose. The ether vapour was produced by blowing air through ether contained in a Buxton bottle, which was stood in a basin

of water at about 8.5° C. This maintained the temperature of the ether bottle, and prevented freezing. As a maximum 5,000 c.cm. of this vapour was pumped into the mask per minute; this was, of course, diluted by the air drawn through the meshes of the domette. He could not at present say what percentage of ether the mixture represented, and did not claim that it was an accurate method of dosage, as the difficulty of producing a constant air supply was great. Once this difficulty had been overcome in a practical and portable way, open ether with a definite strength of vapour would easily be given. But in any case the method had given excellent results during the few months he had tried it. There was less salivation, and the vapour presented to the patient was of a distinctly higher temperature than when evaporated from a Gaye mask. The vapour could be further warmed by leading it through a small coil of india-rubber tube lying in a basin of hot water. The speaker also desired to urge the use of oxygen to prevent the evil effects of secretion when present and difficult to get rid of.

Mr. SIDNEY HAYNES (Birmingham) considered open ether very safe, but had found that a good deal of mucus was formed, and that there was after-trouble with alcoholics in abdominal operations. The induction was long.

Mr. HERBERT TANNER (London) objected to the administration of ether on layers of gauze. He admired the Clover, but objected to the rebreathing into the septic bag. He was in the habit of using an apparatus in which the ether was warmed in the chamber by the exhaled breath.

Professor WALLER (London) said that "open ether" meant 10 to 20 per cent. of ether vapour in the air, and that any apparatus which gave that proportion was to all intents and purposes "open ether." He believed the safe limits of ether percentage were between 10 to 20 per cent.

The discussion terminated in the adoption of the following resolution, which was proposed by Mr. G. ROWELL and seconded by the PRESIDENT OF THE SECTION:

That, in view of the interest excited by the open method of ether administration and the striking claims made on its behalf, the Section of Anaesthetics recommends the Council to appoint a committee to investigate and report exclusively upon this question.

RESOLUTION.

Before the conclusion of the proceedings of the Section the following resolution was adopted, on the motion of the PRESIDENT and seconded by Mr. COTES-PREEDY:

The Section of Anaesthetics approves the resolution of the General Medical Council and of the Departmental Committee of the Home Office respectively, and recommend the Council of the British Medical Association, on behalf of the Association, to take such steps as they may think desirable to represent to the Privy Council and to the Home Secretary the need for the proposed legislation in the interest of the public safety.

SECTION OF ODONTOLOGY.

J. HOWARD MUMMERY, M.R.C.S., L.D.S.Lond., President.

(*Continued from p. 622.*)

THE BUCCAL SECRETIONS AND DENTAL CARIES.

By KENNETH GOADBY, M.R.C.S., D.P.H.Lond.,
Dental Surgeon, Seamen's Hospital Society and National Dental Hospital.

IT is now admitted on all sides that dental caries is due to the action of bacteria. The process has been studied both *in vivo* and *in vitro*. First, the enamel is penetrated locally by the action of acids produced *in situ* by carbohydrate-fermenting organisms. Next the bacteria find lodgement in the dentine and grow through its canals. Finally, the tooth pulp is invaded, becomes inflamed, and ultimately dies. In the earlier stages the lime salts in the enamel and dentine are decalcified, in the later the matrix of the tooth is digested by the proteolytic forms produced by the bacteria. The vitality of dentine is so low from a physiological point of view that protective inflammatory process is wellnigh impossible. Secondary dentine is certainly sometimes formed in the pulp cavity, and it is possible that the increased density of dentine in middle-aged people may be partly a defensive process. As a broad general principle it can be said that no inflammatory reaction occurs in the hard dental tissues. Dental caries is therefore more nearly related to the gradual destruction of wood through the agency of micro-organisms than to caries of bone or necrosis of soft animal tissues.

The outstanding features of the bacteriology of the mouth are:

1. The enormous number of morphological forms present in the mouth in diseased conditions, particularly in caries, or any disease of the gums.
2. The small proportion of mouth bacteria which may be grown on the usual culture media, the morphological forms found in the usual process of cultivation differing very largely from those found from smears made from carious dentine direct.

A little consideration will show that dental caries cannot be due to a generalized acidosis of the saliva, as otherwise it would be more symmetrical, more general, and more severe than is commonly the case. Points where foods may lodge are more frequently the seat of caries than elsewhere. In addition, dental caries is by no means so common in persons with diseased gums as in those with normal gums, and at Budapest last year I pointed out that in pyorrhoea alveolaris or allied diseases, patients affected also with dental caries showed a very high percentage of lactose-fermenting organisms as compared with noncarious mouths.

Before dealing with the bacteria particularly associated with caries, the normal flora of the human mouth must be considered. Its constitution is affected by:

(*a*) Adventitious bacteria derived from food, air, and water.
(*b*) Bacteria owing their origin to pathological conditions of the mouth other than dental caries.
(*c*) Pathological conditions of the throat, tonsils, pharynx, fauces, which may be frequently the source of bacteria found in the mouth.

In the examination of mouth bacteria too little account is usually made of these factors. In a normal mouth free from dental caries or inflammation of the gums, and with no detectable lesion of the throat, the number of bacteria of the mouth is exceedingly small three hours after a meal. Immediately following a meal a number of adventitious forms are to be met with, but if a bacteriological examination of the mouth of a healthy European is made, say, the first thing in the morning, and the mouth is of the normal kind described, practically the only bacteria to be found are: (1) *Streptococcus brevis;* and (2) bacilli closely related to the *B. lactis* and *mesentericus* groups.

Reaction of the Buccal Secretions.—A good deal of importance attaches to the reaction of the oral secretions. Saliva is generally stated to be alkaline, but it is rare to find saliva other than slightly acid to litmus paper, even in mouths entirely free from caries. In examining the mouths of natives at the Seamen's Hospital I have noted three facts.

1. That the mouths are invariably slightly acid to litmus.
2. That although dental caries is not present, turgidity and early inflammation of the gum exists in a large number, and definite gum affections are present in a very considerable number.
3. That in the healthy mouths, free from caries, a considerable number of the organisms of putrefaction are present, associated with only a small number of organisms capable of producing acid from carbohydrates.

In examining a number of monkeys at the Zoological Gardens some time ago an exactly similar condition was found—namely, a large number of organisms of the putrefactive type, a smaller number of carbohydrate fermenters, together with a slightly acid reaction. There is therefore a very close resemblance between the mouths of normal monkeys free from caries and those of the natives previously mentioned.

In persons suffering from dental caries, the acid reaction of the saliva is generally very little more marked than in a normal mouth. Locally, however, wherever caries is in progress, as in carious cavities, the acid reaction is strong. Individuals suffering from dental caries may be roughly divided into two classes.

(*a*) Those in which caries is rampant, where fillings rapidly give out at their edges, and in whose mouths it is common to say the teeth are chalky, and that no fillings will hold.

(*b*) Those persons in whom dental caries is progressing but slowly; attacking perhaps only one tooth around the bands of an artificial denture, or in some sequestered position which does not become cleaned in the ordinary process of mastication or of hygiene.

Bacteriologically these two classes show a very considerable difference, the proportion of organisms fermenting carbohydrate to lactic acid being in the first class about 40 to 1.

In all cases of caries certain species of acid-forming bacteria tend to be present more frequently than others. They may be thus grouped:

(*a*) *Cocci:* Staphylococci (generally albus) and streptococci (commonest type faecalis); (*b*) *Sarcinae:* Lutea, alba (occasionally), aurantiaca (rarely); (*c*) *Bacilli of the acidi-lactic acid group;* (*d*) *Bacilli of the necro-dentalis group:* (Streptobacilli); (*e*) *The saccharomyces group.*

The *Bacillus coli group* is by no means common, and although n certain cases organisms producing fermentation of carbohydrates with gas formation may be found, they are by no means general.

All these organisms are able to ferment glucose, lactose, and maltose, and many of them cane sugar, but the fermentation of cane sugar not only is more feeble but takes much longer than glucose or maltose.

As a general thing it may be said that it takes about two and a half times as long to ferment a given quantity of cane sugar by means of mouth bacteria as it does the same amount of glucose or maltose. In the majority of instances a 2 per cent. solution of glucose or maltose in peptone water having a reaction neutral to litmus will show an acid reaction in five to six hours, often less, cane sugar requiring about thirty-six hours.

I have made a number of experiments with regard to the fermentation of cheap sweets with cultivations of bacteria obtained from carious mouths. In twenty-four hours the amount of acid produced in the case of chocolates was equal to about 1 per cent. of decinormal lactic acid, whereas in the case of sweets of the barley-sugar type the amount of acid in twenty-four hours could scarcely be estimated.

The blastomyces, or yeasts, which are constantly associated with acute caries, are able to withstand a considerable concentration of lactic acid, and at the same time are able to go on fermenting fresh supplies of carbohydrate, provided the excess is neutralized locally, as it invariably is in dental caries, by the adjacent lime salt of the teeth.

I have elsewhere pointed out that in the initial process of dental caries certain other organisms, not in themselves fermenting carbohydrates, are concerned. Often in a mouth apparently well cared for dental caries exists to an alarming extent—a matter of common experience to dental surgeons. In these cases organisms of the *Staphylococcus viscosus* type are to be found, an organism which forms curious gelatinous colonies, almost impossible to remove from the surface of the culture medium without breaking the surface of that medium; this organism easily lives symbiotically with many carbohydrate fermenters. These "sticky bacteria" become attached to the teeth, generally in sheltered positions, and fermentation occurs through the layer which they form on the surface of the enamel, as through an osmotic membrane, the dissolved lime salt diffusing out and the fresh acid diffusing in. In this way considerable patches of enamel may become damaged from time to time, which later on break down, or through the perforation of which other, and often anaërobic, bacteria find their way into the interior of the tooth, and gradually continue the process already set up.

From what I have said with regard to the general bacteriology of dental caries, it will be at once appreciated that prophylaxis may be attempted in two ways:

1. By the removal of fermentable substances through the usual methods of hygiene and the adoption of a suitable diet.

2. By changing the flora of the mouth itself.

In an earlier paper on dental caries I suggested that it might be possible to attempt to combat dental caries by crowding out the acid-producing organisms by others less virulent so far as dentine is concerned. Since then I have carried this point further, and found that a great deal may be done by a proper study of the bacteriological condition of given cases. Certain bacteria (particularly those of the *mesentericus* group) do not ferment carbohydrates to acid, but tend to produce a definite alkaline reaction, and in addition by-products inimical to acid fermenters. It is true that they produce proteolytic enzymes, but these are of no moment where no actual dentine is exposed.

The method adopted is first of all to make a careful bacteriological examination of the mouth, and to determine the type of organism which is present in the largest numbers. Having made a careful survey of the bacteria present, careful cleansing of all portions of the mouth is carried out, and performed with solutions directed particularly towards inhibiting the growth of the bacteria present. In this connexion I find mildly acid lotions compounded with citric acid very efficacious. Cultivations with some innocuous form of organism are then made use of, such, for instance, as *B. mesentericus vulgatus*, or *Bacillus subtilis*, but preferably the first mentioned. The spores of this organism are sown freely about the mouth, and resource is at times made to increase the number present by the use of lotions containing a pure culture of the organism, considerable care being exercised during the period of treatment that those special carbohydrates are withheld temporarily which are particularly susceptible to fermentation by the form of infection present.

The method adopted is in some points similar to the treatment advocated by means of sour milk in altering the flora of the intestine, but in choosing an organism to combat the existing bacteria it may be necessary to try the effect of the combined growth of the two bacteria to determine if the one will grow to the exclusion of the other, as in some instances it is essential to modify the added bacteria. There is no risk of digestive trouble following the use of organisms in this way, provided pure cultures are made use of, and such treatment for rampant caries in the type of acute caries well known to dental surgeons has given excellent results in my hands. Dietetic regulation should be carried out subsequently, as well as regular and efficient hygienic measures and mildly acid mouth lotions.

DISCUSSION.

Mr. HOWARD MUMMERY (London) was interested to hear Mr. Goadby's view of the part played by yeasts with regard to dental caries, especially in active caries at the margins of teeth, as these organisms were too large to penetrate the dentinal tubes. Another point that had not been appreciated was that there were so few bacteria in the normal mouth in the early hours of the morning, and that *Leptothrix racemosa* and the various other common organisms were only associated with pathological conditions. This was rather surprising, as these organisms were nearly always met with in any mouth in the deposit on the teeth, which Mr. Goadby appeared to think was a pathological condition.

Mr. BADCOCK said that Mr. Goadby had touched upon the relative rates of fermentability of various sugars, and this raised a point of very practical interest. As it would be manifestly useless to prohibit patients from consuming sweetmeats in some form or other, he would like to ask what class of sweetmeats he considered least deleterious.

Mr. SIDNEY SPOKES (University College Hospital) wished to refer to the remarks made as to prophylaxis, and especially to the recommendation that in helping to clean the mouth solutions of lactic acid should be employed. He was not concerned to discuss the usefulness or otherwise of the "sour milk treatment." A large number of people were taking such milk with as much satisfaction apparently as the babe at its mother's breast, but certain suggestive cases where dental caries seemed to have broken out among them had led the speaker to impress urgently upon patients the necessity of careful cleansing after taking the dose. It was generally considered that lactic acid formed during fermentation of carbohydrates in the mouth constituted one of the principal dangers to the teeth, and the introduction of curdled masses of lactic acid milk likely to collect and remain in out-of-the-way places seemed to warrant one in warning patients.

Mr. F. J. BENNETT (London) thought that the important papers by Harden and Young on the formation of

a hexose-phosphate in the yeast fermentation of glucose, fructose, etc., were of interest in the question of dental caries, because it suggested the question as to what was the chemical substance which the bacteria obtained from the teeth—was it the basic element, the calcium, or the phosphatic acid element? Was it also possible that alcohol when used as a mouth-wash reacted with the acid of caries to form a neutral ester?

Dr. SIM WALLACE (London) said he was glad to notice Mr. Goadby had insisted on the localized nature of caries, for it was too often assumed that a generalized presence of fermentative processes and points of least resistance were important factors in the etiology of caries. Although cane sugar was fermented two and a half times more slowly in pure cultures, yet was this fermentation as slow in impure cultures? According to Dr. Miller, cane sugar and grape sugar produced a similar amount of acid in a given time. Citric and lactic acids seemed to be antagonistic to the development of acid-forming bacteria, and therefore to the initiation of caries. What about malic acid? From clinical experience it was known that apples were antagonistic to dental caries in itself, and therefore presumably antagonistic to acid-forming bacteria. With regard to sour milk, it could hardly be harmful, because it was an article of daily consumption in certain races, Kaffirs using it habitually. If, however, sour milk was consumed in such a way as to be combined with lodgeable foodstuffs, it was obviously likely to be specially detrimental to the teeth. Kaffirs, however, ate food of a detergent nature, and this no doubt accounted for their excellent teeth.

THE NEED FOR CORRECTION OF MALPOSITIONS OF THE TEETH.

By J. H. BADCOCK, L.D.S., M.R.C.S.Eng., L.R.C.P.Lond.

CONCERNING the causation of dental caries a great deal yet remains unexplained, but there is no shadow of doubt that in the vast majority of cases the lodgement and fermentation of foodstuffs, particularly carbohydrate foodstuffs, is the immediate and exciting cause. Doubtless there are cases where the teeth remain free from caries in dirty mouths abounding with débris of all kinds, and where this immunity is transmitted from parent to children, but it nevertheless remains true that for most practical purposes we may regard the stagnation and fermentation of foodstuffs as the all-predominating factor in the decay of teeth. Prevent it and you will prevent caries, or, in accessible positions, arrest it if already begun.

If you will look into the mouth of a healthy animal living in a natural environment, or into the mouth of a young and healthy child fed on suitable food, the first thing that will strike you is its beautiful cleanliness. The teeth are white and flawless, the gums a pale rose colour, firm, hard, and closely applied to the teeth; there is no sign of débris anywhere. If the inspection be made immediately after a meal and a few fragments do remain, they will be floating free in the saliva, ready to go with it, as it is normally swallowed, nowhere adherent.

What are the factors which bring about this condition? First, there is the texture of the teeth, very hard and very shiny, eminently adapted not to hold food after comminution. Then there is the shape of the teeth. The morsal aspects, developed into cusps in the grinding teeth, in normal arrangement so fit and interdigitate with the surfaces of their opponents as to bring every part into apposition during some phase of the complicated movements of mastication. The lingual and buccal surfaces are rounded, with a bulge that serves to throw the food off laterally and prevent its being forced up between tooth and gum. This bulge is more prominent on the lingual aspects of the upper teeth which tilt outwards, less prominent on the lingual aspects of the lower teeth which tilt inwards, and most prominent of all in the milk teeth, to afford extra protection to the younger and softer gums, yet nowhere prominent enough to afford a stagnation point beneath it. The mesial and distal surfaces spread forward and backward to bridge over and protect the interdental papillae, which in their turn completely fill the spaces which exist between the teeth in the dry specimen, and, so long as they remain unimpaired, make lodgement of food therein impossible.

Tough or fibrous food driven by firm muscles on to teeth of such pattern cleanses them thoroughly in the very act of use, and by its beneficial friction keeps the gums, protected at the free edge (the only vulnerable point) by the bulge of the tooth, hard, healthy, and clean.

There is a third factor, the arrangement of the teeth in their relations to each other, and this is pathologically by far the most important, because, while abnormality of shape is rare, abnormality of position is exceedingly common.

In the normal arch all the teeth are regularly placed and in firm contact; the finer the denture the harder the contact. The contact points are placed where the enamel is thickest, and are very small in area owing to the curves of the teeth. Inasmuch as each tooth has a slight independent movement in its socket, when in use it rubs against its neighbours, and so slight facets appear at the contact points, and the more vigorous the teeth are used the more marked are the facets. Now, facets imply wear, and yet as age advances the teeth are as closely applied as ever. This is because of the tendency which exists for the molars to move forwards, and to a less extent for the premolars to move backwards, so that the members of the arch are kept pushed together and the formation of spaces between them averted. The contact points are so small as to afford the least chance of lodgement, and the movement between the teeth keeps them polished.

Not only are the relations of each tooth with its neighbours in the same jaw important, but also its relation to its opponent in the opposite jaw.

In each jaw the cusps of the premolar and molar teeth form two ridges—an outer and an inner ridge. When the mouth is closed the outer ridge of the lower fits between the two ridges of the upper, and the inner ridge of the upper between the two ridges of the lower; in other words, the lower arch is partially overlapped by the upper. Moreover, each cusp in each jaw interdigitates with two in the opposite jaw, each cusp in the mandible shutting in front of the corresponding cusp in the maxilla. As a result every surface of the morsal aspect comes into play during the lateral movements of the jaws which takes place in mastication. Any irregularity in arrangement will disturb these relations with detriment both to the self-cleansing and the masticating mechanism, and the greater the irregularity the greater will be the harm done

If the teeth be spaced ever so slightly, food will be forced down between them and lodge there, particularly fibres of meat and fish, and these fibres being mixed with carbohydrate material eaten with them, fermentation will take place and caries be set up; in addition, that important structure, the interdental papilla, will be destroyed, leaving a permanent space between the necks of the teeth which cannot by any means be kept clean.

If the teeth be crowded, they will no longer touch their neighbours at the points designed to touch, but in such a way that their curves will fail to correspond as they were designed to do, and crevices will be formed and often large surfaces of enamel will be brought into contact; or, what is worse, almost in contact and exposed to the action of the fermenting foodstuffs which are packed in at every meal until the space is full and have no opportunity of escape.

One or more teeth may be thrown wholly or partially inside or outside the line of occlusion with their opponents, and so miss the friction which they would otherwise obtain in the act of chewing.

Such teeth will rapidly become coated. This condition is very frequently seen in wisdom teeth crowded outside the normal arch, and protected from friction by the cheeks. If a tooth be outside the line of its neighbours, an uncleansable cul-de-sac will be formed behind it, or, if forced behind its neighbours, in front of it. In short, it will be clear from the illustrations shown that there cannot be irregularity of even a single tooth without damage to the self-cleansing power.

It is, therefore, an important principle of caries prophylaxis that any irregularity of the teeth shall be, if possible, prevented by endeavouring to ensure normal growth of the jaws by the use of food suitable both in nutritional value and physical characteristics, as advocated by Dr. Sim Wallace, with, if necessary, the aid of mechanical apparatus

to stimulate growth and make room for the teeth in normal positions. If the age of prevention be passed, and crowding has already occurred, steps should be taken to correct it, and, generally speaking, the earlier such steps be taken the better; the younger the child, the more easily are the teeth moved from the faulty positions and retained in their correct relations. Moreover, this predisposing cause of caries has less time to act.

Any consideration of the methods by which crowding may be corrected is outside the scope of this discussion; suffice it to say that regularity of the dental arch may be obtained either by expanding the alveolar processes to accommodate the teeth in full number and correct relation, or by the removal of teeth and the rearrangement of the remainder in an arch smaller than the normal.

Of these two methods, the former is capable of giving the most ideally perfect results and restoring the normal in every particular, and it is more than probable that the application of pressure on the alveolar ridges stimulates growth in the jaws themselves, and, in the case of the maxilla, of the nasal passages and the accessory cavities.

In practice the method of treatment by expansion of the jaws is for the wealthy classes who can afford the expenditure of time and money incident upon it, while the extraction method, with mechanical aid when necessary and obtainable, is for the poorer classes. Its results in intelligent hands are often exceedingly good, and always a vast improvement upon a condition of crowding which is more than slight.

When mechanical aid is impossible or, as in rare cases, inadvisable, much may be done by judicious extraction only; but it must be borne in mind that if extraction be not undertaken on well-considered lines with intelligent appreciation of its consequences, the result may be worse than the condition it was intended to alleviate.

To sum up—any oral conditions which tend to uncleanliness will favour caries, while conditions tending to cleanliness will aid in its prevention. It is natural for the mouth to be clean. This natural cleanliness is due to several factors—namely:

(*a*) The hard and polished surfaces of the teeth.
(*b*) The shapes of the individual teeth.
(*c*) Friction of hard food upon the teeth and gums in the act of chewing.
(*d*) The arrangement of the teeth with relation to one another.

Any departure from the normal arrangement favours the lodgement and stagnation of food, and should be prevented or corrected as soon as possible.

The correction of irregularities of the teeth tends to the prevention of caries in direct proportion to the degree in which the result attained approaches the normal.

DISCUSSION.

Mr. W. Booth Pearsall said that on examination of the teeth in skulls of ancient races it could be seen that the contact points between the teeth were well marked, and in many instances 1 mm. in diameter. They got worn with well-marked facets. In the cases of well-marked attrition the curves commonly seen where the cusps were worn away were similar to those of the natal teeth, but rather more flattened. The compensatory curve remained, but in the contact attrition came by very vigorous mastication; the worn surfaces of the teeth retained a curve between the buccal and lingual surfaces.

Mr. J. Milligan (Barrow-in-Furness) suggested that good contact points in the teeth of prehistoric man was a factor which acted in preventing the occurrence of dental caries among the early races of mankind.

Mr. Badcock, in reply, said that he had no knowledge of the conditions obtaining in paleolithic skulls, but in various ancient skulls which he had examined he had found the contact points large and well worn. This he attributed to the large amount of grit prevalent in the food of early times and the amount of work the jaws had to do in days when food was tougher than it was now. The very general disappearance of cusps in such skulls he attributed to the same causes—more use and more grit.

THE EFFECTS OF DRUGS IN THE CAUSATION OF DENTAL CARIES.

By Harold Austen, M.D.Lond.,
Assistant Dental Surgeon, St. Bartholomew's Hospital.

Before we can consider the correction of the effects of drugs upon the teeth it is necessary first to inquire what these effects are.

There is a very widely-spread and deeply-seated popular belief that the taking of drugs is a common cause of the decay of the teeth, and times and again one hears a case of rapid caries in the child or young adult set down to the fact that they have taken a large quantity of medicine.

This belief is fostered, first, by the fact that certain drugs such as iron cause an obvious, though superficial blackening of the teeth; and, secondly, that decay of the teeth is found to be prevalent after such disturbances of the general health as are commonly treated, partly at all events, by the administration of medicines.

Examples of general disturbances which seem to be associated with the production of caries, probably through an abnormal condition of the oral secretions, are found in anaemia, dyspepsia, pregnancy, acute rheumatism, enteric and other continued fevers. The belief that drugs injure the teeth, however, appears to rest upon but slender foundations, the popular belief being based upon the argument, "*post hoc, ergo propter hoc.*"

Two classes of drugs would appear to be prima facie a potential source of caries.

1. Very dilute solutions of weak acids have been shown by experiment to be capable of destroying the enamel of teeth by decalcification. In order to produce this effect, however, it is necessary that they be applied *continuously*. All modern research tends to prove that acids highly injurious to the teeth are generated *in situ* by the fermentation of the remains of carbohydrate foods. Such acids are formed from sticky or viscid materials which are not readily soluble in the saliva, and in places which do not readily admit of natural cleansing; they have consequently the necessary opportunity for continuous action. Now, in the mouth, acid medicines and gargles are not applied continuously, but very intermittently. They come in contact mostly with the exposed surfaces of the teeth which are constantly washed by the saliva, in which these acids are freely soluble; while a further removal of any acid that remains must take place whenever food is taken by the mechanical scouring that occurs during the act of mastication.

From these considerations it is difficult to see how the necessarily weak solutions of acids taken can ever have any marked injurious effect.

2. Mercurials when administered in infancy have been credited with the production of hypoplasia of the teeth, the so-called honeycombing. Representations of typically hypoplastic teeth, described as "mercurial teeth," have figured in certain surgical textbooks. It has been alleged that mercury enters into the composition of certain secret remedies largely used by the poorer classes as teething powders during the period of the eruption of the temporary teeth, producing the effects described upon the permanent dentition. The evidence for this is far from convincing, while it is quite certain that hypoplasia is seen in many cases in which no mercury has ever been administered, and arises from disturbances of the general health during the period when the crowns of the permanent teeth are being formed. It is quite possible, however, that mercurials may sometimes be responsible for the production of hypoplasia, and this may be considered as an instance of a medicine causing a predisposition to caries, to which hypoplastic teeth are very liable. Mercurials administered in large doses have long been known to cause well-marked disturbances in the associated tissues, the gums and even bone. It is conceivable that mercury acting in this way, when there has been actual ulceration, or loss of tissue, may cause a predisposition to caries at the necks of the teeth.

Lead, bismuth, silver and copper, being drugs partly excreted by the oral mucous membrane, have been credited with occasionally producing similar effects to mercury, in septic mouths.

The only treatment for the correction of the effect of any drugs appears to be to maintain complete cleanliness of the mouth, and to neutralize the possible effects of acids taken by the immediate use of an alkaline mouth-wash.

DISCUSSION.

Mr. C. EDWARD WALLIS said that having had during the last few years opportunities of examining the mouths of many hundreds of London County Council school children, he had given a good deal of time to finding out to what extent the children of the poorer classes were dosed with mercurial teething powders. What he had learnt indicated that a great number of these children were practically brought up during their infancy either on grey powder or on various proprietary so-called teething powders containing mercury. In spite of this, there was remarkably little hypoplastic enamel amongst the permanent teeth of these school children—certainly less than 2 per cent. Mercury had little or no effect. These facts clearly upbore Dr. Austen's views regarding the practically negligible effects of the internal use of mercury upon the dental enamel.

SUSCEPTIBILITY AND IMMUNITY TO DENTAL CARIES.

By J. HOWARD MUMMERY,
President of the Section.

WHILE agreeing that the principal factor in the great increase of caries of the teeth is the soft, cooked food of civilized man favouring accumulation and consequent local fermentation, it does not seem possible to me that predisposing or determining causes are not also at work.

In any question of physiology or pathology concerning the human body, do we find such simple issues, do we not find many factors determining the incidence of disease, and it is not probable that caries of the teeth—exceptional pathologically as this disease may be—will prove any exception to this rule.

I should like to think it were such a simple question as these speakers consider it to be, for we then should be much nearer to some satisfactory solution of the problem, and to the eradication of a disease which, while not directly dangerous to life, is one productive of more widespread deterioration of physique than perhaps any other. With regard to mastication of the food, we know that among modern civilized people it is rare to find a muscular apparatus capable of exerting the same amount of attrition of the food that the muscles of prehistoric man possessed. I have the mandible of a child from an early British barrow that shows an amount of attrition that certainly could not be obtained by the feeble jaw muscles of the child of these days, however hard the food.

In dealing with this part of the subject we have to consider, in the first place, what are the innate conditions of the body that confer immunity to caries, if such conditions are present, and why some individuals escape the disease, while the majority are very susceptible.

Certain protective substances of the nature of alexins may, and certainly do, appear in the saliva, which act as antitoxins to certain toxic bacteria, but we cannot understand how these substances can confer immunity in caries, which differs from other diseases in that the first stage is a purely chemical action, consisting of decalcification by an acid. We have therefore to look for some causes that control fermentation and consequent acid production in the mouth.

It is within the experience of all of us that certain individuals, sometimes for their whole lifetime, sometimes for a more or less lengthened period, show a complete immunity to dental caries. On inquiry, it is found these fortunate individuals live under the same conditions and surroundings in very many cases as their less fortunate neighbours, and apparently take no greater care of their teeth. If food is the sole cause of caries, how do we account for these cases?

Some experiments carried out by Professor Miller on the saliva of immunes and susceptibles showed very little difference in the rapidity with which lactic acid was formed, the results in these experiments being slightly in favour of the immune.

There can be little doubt, however, that, whatever the causes of this immunity may be, the exact conditions present in the mouth cannot be reproduced in a laboratory experiment.

With regard to the effect of the composition of the teeth as affecting the incidence of caries, there has been considerable controversy, Professor Black considering that "neither the density, nor the percentage of lime salts, nor the strength, is in any degree a factor in predisposing the teeth to caries," but, as has been pointed out recently, the experiments of Black, like those of Miller, on hard and soft teeth were made upon the dentine, and the tissue exposed in the mouth is the enamel.

Professor Röse has shown that in burring enamel an eminent difference in degree of hardness is shown by this tissue, and Miller has pointed out that while the percentage of lime salts may be the same in different teeth, the molecular conditions may be variable—the degree of stability of the compounds formed with the organic material may differ in some teeth.

Professor Röse states that continual metabolic changes are taking place in the dentine and cementum during life, but that these changes do not affect the enamel, the hardness or softness of this tissue being determined in the infant at the time of calcification.

The prolonged action of a weak acid will show different effects in different teeth, as shown by Mr. Stanley Mummery in his communication to the Odontological Section of the Royal Society of Medicine. This difference may account for the extensive caries seen in some persons after a prolonged illness, the more continued contact of the acids breaking down the resistance of the enamel, while another individual exposed to the same conditions may escape altogether, owing to the more resistant nature of the enamel. For my own part, I never could accept Dr. Black's experiments as proving that the structure of the teeth has no influence whatever on the incidence of caries—it seems quite contrary to clinical experience; and the researches of Professor Röse and others seem to show very clearly that the enamel, which must be the tissue principally concerned, does show differences in degree of calcification, and although these changes do not take place during adult life, there are many influences brought to bear upon the early tooth germs that would affect the degree of calcification of the enamel and determine the ultimate occurrence of caries.

Action of the Saliva and other Fluids of the Mouth.

It was long thought, chiefly as the result of the experiments of Sanarelli, that the saliva acts as an antiseptic, but the well-known experiments of Miller and Hugenschmidt showed that, far from being an antiseptic, saliva served as a very good culture medium for bacteria, which is what we should expect, knowing how bacteria flourish in the mouth and that people who have a very copious flow of saliva are often the subjects of very extensive caries.

The experiments showed that Sanarelli had used filtered saliva, which was saliva deprived of all its nutritive qualities for bacteria, and his experiments were necessarily inconclusive.

It was shown that the saliva contains diastase and microbial ferments which exercise a positive chemiotaxis on the leucocytes, and so tend to free the mouth, to some extent, of bacteria.

Miller concluded that it was this action of the saliva that was effective in bringing about the rapid healing of wounds in the mouth. The saliva also fulfils a very important rôle in the mouth by mechanically freeing it of microorganisms which are carried into the stomach in the act of swallowing.

The question also arises, if saliva, although not able to destroy microbes, may act on their soluble poisonous products, certain African tribes using saliva as a remedy for snakebite.

The question of the action of the sulphocyanide of potassium present in normal saliva has again been raised, but Miller and others have definitely shown that in the very minute quantities in which it is found in the mouth it could have no effect in the inhibition of caries.

No doubt some influence is exerted by the reaction of the saliva; it is found that when the saliva of the horse is mixed with a definite quantity of sugar much less acid is formed than when the same amount of sugar is fermented with human saliva.

This neutralization of the acid formed in the mouth of the horse in consequence of the high alkalinity of the saliva may be one of the causes why the horse, although

by no means immune to caries, is less prone to the disease than man.

The reaction of the saliva we should expect to have a distinct influence on immunity to caries, as a strongly alkaline saliva would, by the neutralization of the acid first formed by the fermentation of the food, tend to delay the destructive process on the tissues of the teeth.

As I shall point out presently, however, an alkaline pabulum is more suitable for the growth of acid-producing and other bacteria than an acid one.

Where the food is allowed to accumulate, as in the buccal sulci and between the teeth of old horses, rapid decay takes place, the alkaline saliva not penetrating to the depths of these accumulations.

For the same reason, in the human mouth, retention centres are an important factor in the production of caries, and it is also well ascertained that sterilization of the mouth cannot be obtained when these accumulations are present, the antiseptic used not being able to penetrate to the surface of the enamel or dentine where the active fermentation process is in progress.

In many experiments carried out by Professor Miller it was shown that by the careful use of the toothbrush and silk immediately before the application of the disinfectant wash, the mouth could be rendered sterile, no growth taking place in the mixed saliva taken from the mouth for some little time afterwards.

The variations in the composition of the saliva in different individuals are very considerable.

In some cases, according to Dr. Michaels, the saliva contains considerable quantities of glycogen; in other cases very little. This substance would serve as perfectly as other carbohydrates as a pabulum for caries producing bacteria, and the amount present may possibly have some influence in individual susceptibility to caries.

Alterations in the nutritive properties of the saliva as a culture medium might profoundly modify the growth of sensitive bacteria, and so influence considerably the production of lactic acid.

As pointed out by Dr. Kirk in a recent paper, when the saliva is mucoid in character it is invariably alkaline—mucin being precipitated by acids, saliva when of thin consistence and acid reaction being free of mucin.

This author has observed that where there is thin limpid saliva of acid reaction, there is generally an absence of active caries, and that the carious process is most active in mouths which show an alkaline reaction and highly mucoid saliva.

It is well known that bacterial growth proceeds best in a neutral or slightly alkaline medium, and that an increase of lactic or other acid beyond a certain amount inhibits the growth of micro-organisms.

When lactic acid, formed in the mouth from glucose or other carbohydrates, comes in contact with mucin, the mucin is precipitated, and, according to Dr. Kirk, forms one form of bacterial plaque upon the teeth, the mucin acting as a binding material to the mass of micro-organisms.

In experiments carried out in the laboratory Dr. Kirk was able to produce a precipitation of mucin in the form of a large plaque, the reaction of the medium being acid. It would thus appear that saliva of an alkaline reaction, when much mucin is present, is more likely to give rise to acid fermentation than an acid saliva, and that the precipitation of the mucin by the acid produced in the mouth serves to bind the bacteria together in contact with the tooth substance and intensify the local action of the acid. The use of lime water as a mouth-wash has been recommended, this being a rapid solvent of mucin, and thus tending to free the teeth of this film-like deposit.

The author considers that, it being shown there is no antiseptic action of the saliva, "we are justified, in our present state of knowledge, in viewing immunity to carious action as being dependent upon the amount of pabulum upon which the bacteria of decay normally thrive." The local precipitation of mucin by the secreted lactic acid he looks upon as an important factor in the production of caries.

The much vexed question of heredity I shall only briefly refer to. We cannot consider that defective teeth are directly inherited, if we agree with most evolutionists in discarding the doctrine of the inheritance of acquired characters, and it certainly seems to be evident that in civilized communities natural selection is in abeyance, and artificial selection has not taken its place. Among the masses in civilized countries the tendency is to deterioration of physique, and this would naturally be expected when natural selection is no longer active in ensuring the survival of the fittest.

Of course, if we accept Dr. Black's conclusions, we must consider that heredity has very little influence, but if a community with less sound and resistant tissues is found among civilized peoples, we must think that it is to be looked upon as a factor.

THE VALUE OF TEETH IN THE HUMAN ECONOMY.

By J. G. TURNER, F.R.C.S.,
Dental Surgeon, St. Thomas's Hospital.

MANY years ago my attention was drawn to this subject by an aged relative, who, though toothless, ate pork crackling with relish, and lately the question has become insistent owing to large numbers of indigent patients at a big general London hospital. What is the value of teeth to the human economy in the conditions of contemporary civilization? No one will deny their intrinsic beauty, and in my opinion complete regular dental arches (exception made of the third molar), articulating within the limits of normal, are indispensable to the full beauty and nobility of the human countenance. On this account I set a great value on the retention of temporary teeth till their due date of shedding. Early loss means contraction of the dental arch and sequent exclusion of a permanent tooth, unless the child can be induced to wear some form of apparatus designed to preserve the full size of the arch.

Many people postulate for the temporary teeth, or perhaps I should say for the presence of teeth during the growing age, a far more important rôle. The argument runs that the stress of mastication promotes the development of every part to which it can be traced; therefore, in its absence, development fails. But the jaws and the facial bones in general subserve other functions—speech, breathing, smell, sight—besides mastication, and these Nature, doubtless, has equally in view when the impulse of growth is given on impregnation. But the best answer is supplied by the case of idiot children, such as may be seen at Darenth, whose mental development is so low that if given solid food they make no attempt at mastication, but swallow it whole and choke themselves. They are therefore always spoon-fed on slops. Yet their jaws are above the average in size.

It may be added on this point that the mandible is a loose bone with no such yoked articulation, demanding perfectly correlated growth for full performance of its function, as obtains in the case, for example, of the ulna. Hence we may expect that so long as its function is satisfactorily performed there will be considerable variation in its size and consequently in the dental articulation. And this is exactly what we do find. It makes no difference to mastication or cleanliness whether the lower teeth bite forward or backward, inward or outward, in their relation to the upper, and Nature is not over-particular on the point.

The question, however, to which I wish especially to direct attention concerns the value of teeth in nutrition. What is the value now and here of tooth mastication? Till recently the only recognized dental defect was deficiency in the numbers, and whatever ills—chiefly those in which failure of nutrition was an outstanding symptom—the physician saw fit to connect with teeth were ascribed to a deficiency in number; to loss of tooth masticatory power. As a consequence, both in the popular and the medical mind, the idea of the almost vital importance of teeth became fixed as an axiomatic truth.

Teeth are for eating.
Therefore you cannot eat without teeth.
Therefore teeth are indispensable to life.

This is an *a priori* argument which seemed to fit in well with facts, since most people began to lose their teeth early in life.

NOW we have learnt the importance and extent of oral sepsis, and it becomes imperative to inquire whether the belief in the importance of teeth may not have lost some of its old-time force. The dental profession, I find,

presents two camps—one camp bewails that the food of civilized man nowadays affords no use for teeth; the other is continually crying "more teeth." The former camp, I hope, will be with me in pushing the argument, when needful, to its logical conclusion.

When mastication is spoken of, tooth mastication is always meant. But there are also tongue and gum mastication, and machine mastication. Our cereal foods are finely ground, and can readily be dealt with by tongue and gum mastication; and our meat can be cooked and minced or shredded beyond the powers of the most efficient tooth mastication. In the presence of food, salivary and gastric reflexes are as readily and efficiently promoted by tongue and gum mastication as by tooth mastication.

Hence we may expect to find as a working rule that teeth are a non-essential; and *de facto* the conclusion is right. In hospital practice I unhesitatingly remove from the mouths of children of any age every septic or painful tooth; leaving some edentulous, many practically so. The result is always greatly to the child's benefit. When the children are seen one or two or three years after they are always well-grown and well-nourished, and the mothers make no complaint of any difficulty in feeding them.

I do the same in the case of adults, and with similar results. Patients who were slowly dying of oral sepsis return to work in their edentulous state, and when they come back six months later asking for false teeth they are unrecognizable in their new-found vigour. Obviously they have been able to nourish themselves to the full extent of metabolic possibilities, and they acknowledge it on questioning. The only unmanageable food one labourer could think of was pickles.

The following cases show that the state of stable nutritional equilibrium can readily be maintained in the edentulous. I dined lately with a healthy old gentleman of 80: there was a full-course dinner of fish, roast mutton, etc., of which he ate his due share. After dinner he told me he had been edentulous for twenty years, having discarded his false teeth as impracticable.

Five years ago a medical friend of mine saw two sisters: the elder had a full set of teeth and was healthy, the younger had pronounced oral sepsis and was always ill. The younger had all her teeth out, but never got a false set. To-day the positions are reversed: the younger is healthy and strong, but the teeth of the elder have gone the way of all teeth and she has a septic mouth, and she is the invalid.

There is a point which concerns the partly edentulous which needs mention. A few teeth interdigitating rather than opposing may actually interfere with mastication rather than assist, and especially so if septic or painful, though I have been surprised to find that, for example, the isolated lower canines I leave, when possible, to steady a lower denture are no source of inconvenience to my hospital patients, perhaps owing to the absence of sepsis.

On the insertion of false teeth tooth mastication is restored and tender teeth relieved, but equally useful mastication would have been obtained by total extirpation. And here I may ask those physicians who differ fundamentally from me in their estimate of the value of tooth mastication whether some such condition was not present in the cases on which they base their estimate?

To test my opinion I obtained leave to visit the Brompton Hospital Sanatorium, and with Dr. Paterson examined forty inmates, male and female in equal numbers. Owing to the care of the dental surgeon at Brompton in dealing with sepsis, I found a considerable number practically edentulous, and many with but a small amount of tooth-masticating surface. But Dr. Paterson told me he found no difficulty in feeding them, nor did the absence of teeth bear any causal relation to the incidence of indigestion. In spite of the absence of teeth the patients improved. One man in his edentulous state had reached and maintained, while doing labourer's work, his highest known weight; another recovered through having no teeth in his upper jaw, and has been working now four years as a tailor's fitter.*

Nature herself makes numerous experiments in the same direction, as the following pictures show:

1. Here is a picture of the mouth of a young man who belongs to a large family exhibiting hereditary hypoplasia of the teeth. His teeth have never been more than stumps level with the gum, yet he is an athletic man who never ails in any way.
2. The lower jaws of these two children shut frog-like inside the upper, yet the children are well grown.
3. These three children have marked inferior protrusion, and only one molar in each quarter in opposition, yet all are absolutely healthy.
4. This child can only bite on four molars, one in each quarter, and only on the cusps of these, and yet it is as healthy as other children.

* He was fitted with an upper set soon after returning to work.

These cases touch a point I have been endeavouring to settle—namely, how many opposing teeth may reasonably be considered as affording sufficient tooth-mastication power? They seem to tell us four molars, provided two oppose two. Certainly one good side of the mouth (or a molar and two bicuspids in each quarter) is amply sufficient, but I have seen far less suffice; and where more seems imperative I think a little more care in diet would be an equally efficient remedy.

My answer to the question, What is the value of tooth mastication? is that among civilized peoples of to-day tooth mastication is a non-essential; the edentulous can, with a little care, fare equally well with the fully equipped.

To the question, What, then, is the value of teeth to civilized man, I answer, "Beauty." Beauty it is that is in the balance against sepsis. I have brought up this subject hoping to find others whose experience is similar to my own, and that so we may open a way out of the difficulty presented by the impossibility of supplying artificial teeth to every hospital patient who appears to need them. The difficulty will vanish when both physician and patient realize that sepsis is the enemy, not loss, and that it needs but a little care to fare just as well in an edentulous state as with a full set of teeth.

DISCUSSION.

Mr. HOWARD MUMMERY (London) said that in his experience it was remarkable to find how much persons improved when they had had their teeth removed, such teeth, of course, being in a septic condition. Persons with septic mouths, and who remained in what was usually called very good health, were really living over a volcano which might at any time become a cause of grave trouble. The patients became subjects of septic poisoning, an attack of influenza or some such lowering disease being the determining cause. He agreed that no teeth were better than septic teeth, though no teeth were not better than artificial dentures, as many edentulous people would not take sufficient trouble with their food.

Mr. MILLIGAN (Barrow-in-Furness) feared that in the absence of teeth food would not be retained in the mouth long enough to ensure thorough insalivation. He thought soft food alone could be eaten. He agreed that anaemic girls especially improved greatly after wholesale extraction, and asked which Mr. Turner considered more important—the removal of sepsis or the restoration of more efficient mastication?

Dr. M. H. CRYER (Philadelphia, U.S.A.) said that while Mr. Turner's paper would be taken as a most radical suggestion, both in this country and in America, there were many points with which the speaker fully agreed. Teeth were not so absolutely necessary for mastication and insalivation as was generally supposed, especially when food was prepared as it was in this and other civilized countries. The orthodontist, in endeavouring to save as much masticating surface as possible, often induced a pathological condition of the teeth and surrounding tissues which was most detrimental to the good health of the general system. The power of tooth mastication did not depend so much upon the great surface used as upon a few definite points of occluding force, so that entire dentures were often less useful than a few occluding sound or well-filled teeth. One tender spot in a large occluding surface would do incalculable harm in causing a tendency to "bolt" the food, whereas even an edentulous person would keep the food in the mouth long enough for the salivary glands to perform their function. On the other hand, there was no question but that the greatest of care should be used in keeping deciduous teeth in good condition until the permanent ones were ready to take their places, and then in exercising the most exhaustive

vigilance to keep them free from any condition which would produce oral sepsis, by using all the known means of hygienic care and by well-placed and carefully-finished fillings when necessary. Artificial teeth were of great importance, and demanded the highest standard of workmanship and good sound judgement, with the view always of conserving the best interests of the following functions—mastication, insalivation, speech, and aesthetic values.

Mr. BOOTH PEARSALL (London) thought it might as well be argued that the intestinal economy was badly designed because of stomach-ache. He could point to many people restored to health by means of artificial teeth. He attributed an important rôle in the production of ill health to improper occlusion of the teeth.

Mr. J. LEWIN PAYNE thought Mr. Turner's contention that teeth were non-essential as masticatory organs, and of little importance in the human economy, demanded much stronger evidence than had yet been put forward. If such were a fact, it seemed strange indeed that Providence had endowed practically all vertebrate animals with an ample masticatory apparatus, which persisted in a high state of development in spite of many other changes in the anatomical structure. If, with a little care, the edentulous could fare as well as those with teeth, why had these organs remained so long? A certain percentage of people might manage tolerably well without teeth, and it was undoubtedly true that an edentulous patient was better off than one whose mouth was reeking with septic roots; but when such theories as these were stated as facts they were in danger of going from one extreme to the other, and of overlooking entirely the functional activity of the mouth. Furthermore, teeth were required in the human economy, not merely as a means of beauty and for mastication, but also as an aid to speech and in the development of the jaws.

Mr. TURNER, in reply, said that some of the speakers seemed to have mistaken the intention of his paper. As he had said, his object was to simplify the treatment of hospital patients by urging what seemed to him a fact, that an edentulous patient could fare just as well as one with a full set under the food conditions of the civilization of to-day. If, however, his conclusion held good for hospital patients, it held good for all. He had pointed out a fact of which those who criticized him had taken no cognizance—that a few interdigitating teeth, especially if septic and tender, would be a detriment rather than an aid; and unless his critics could assert that each case which had influenced their opinion was an aseptic completely edentulous mouth, their criticism was at present valueless. The presence of teeth was not at all necessary to the retention of food in the mouth till insalivation was thoroughly effected; on the other hand, both with teeth and without it was possible to reach the physiological limit of the use of mastication with resultant nausea and vomiting. As to meat, teeth were scarcely used for its comminution—it could be easily cut with a knife and fork into fragments as small as ever teeth cut it. The deck of a channel steamer on a rough day provided excellent material for studying the point. An appeal to the lower animals did not furnish his critics with much comfort. In them teeth were more for prehension and fighting than for mastication. He did not think malocclusion could be held responsible for much, since the articulation of the adult both in savage races of to day and in skulls from old graveyards, etc., was generally a flat mill. Moreover, Nature had found that in the case of a herbivorous diet—which of all diets entailed the most severe use of teeth in bruising and pulping the grass—a flat mill with a slightly salient enamel "pattern," as in the horse, was the most efficient masticatory apparatus. He was very pleased to learn Dr. Cryer's agreement with his proposition, and especially with his point as to the value of a "concentrated" mastication on a few teeth as compared with the "diffuse" mastication of a full set. Mr. Mummery's summing-up fairly expressed the meaning of his paper.

CROWN AND BRIDGE WORK.

A PAPER dealing with crown and bridge work was read by one of the Honorary Secretaries on behalf of Mr. Harry Baldwin. Its main contention was that well-fitted collars and bands, even if passing beneath the gums, are non-injurious and non-septic, and that properly constructed crowns are to be regarded as the most perfect substitute known for natural teeth. Most of the members who discussed this paper dissented from the views expressed. They held that, however careful and skilled the work might be, real accuracy and fit could never be obtained, and that mouths containing bridges and crowns must always be in a more or less septic condition. On this account their use should be avoided when possible.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

ATROPHIC RHINITIS FOLLOWED BY GUMMA OF BRIDGE OF NOSE.

THE following is a note of a case of atrophic rhinitis, followed by gumma of the bridge of the nose, in a boy of 12.

The patient, a weakly, ill-developed lad, was first seen in February, 1908. He had several fits when 1 year old, and has always been delicate and not allowed to go to school. He has a sister, aged 18, who is quite well. There is a history of one miscarriage one year before the birth of the boy. There are remains of old iritis of the left eye, which diverges. In both eyes there are extensive old choroidal changes, chiefly along the vessels. There has been a bad smell from the nares for five or six years. The boy has well-marked atrophic rhinitis, with crusts, more marked on the right side. Small doses of hydrarg. c cret. and a formalin spray were ordered.

The boy was not seen again until August, 1909. He had not been well for some months, and had been taking hydrarg. c cret. since February, 1908. Ten days before his visit

a red, painful swelling appeared on the bridge of the nose which burst after five days. There was a large ulcer, the size of sixpence, with indurated edges, on the bridge of the nose, which had perforated the nares. Both nostrils were full of crusts. Weak chromic acid and carbolic acid were applied at intervals of a few days to the ulcer. Inunctions of ungt. hydrarg. and large doses of potass. iodide were ordered. The nares were sprayed with formalin and peroxide of hydrogen. In spite of this treatment the ulcer was spreading rapidly, and on September 5th was larger than a shilling-piece. Decoctum sarsae co. was then ordered. In three days there was marked improvement, and in ten days the ulcer was much smaller. I did not see the boy again until April, 1910. The ulcer had healed in October and there was dense adherent cicatricial tissue covering the old perforation. This case is interesting from several points of view.

1. It proves that atrophic rhinitis can be due to congenital syphilis.[1] There can be no doubt that the boy was suffering from this disease.

2. Although the boy had been taking hydrarg. c cret. for eighteen months a gumma developed on the bridge of the nose.

3. Mercurial inunctions and very large doses of potass. iodide failed to arrest the growth of the gumma, whereas decoctum sarsae at once effected a cure.

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PUERPERAL SEPTICAEMIA.

ON April 27th, 1910, Mrs. D. was confined of twins. She was extremely anaemic and had suffered from great swelling of the legs and feet for several weeks. She had not been medically attended for this. There was no history

[1] Alexander, *Archiv. Laryngologie*, 222 and 223.

of any vaginal discharge. When first seen her pulse was 120, and the pains very feeble and infrequent. Both children presented by the head, and were delivered with forceps as the pains were not sufficient to do more than engage the head in the pelvic brim. She had severe *post-partum* haemorrhage, which was checked and finally stopped by compression of the abdominal aorta. The uterus was douched out with creolin as hot as could be borne.

On the 28th the temperature was 100° and rose the next morning to 102°. The lochia were scanty but sweet, and the patient said she felt very well, had slept fairly, and taken a moderate amount of food. By the evening of the 29th the temperature was 104.5°, the pulse 148, and as there was a faintly putrid smell about the lochia the vagina was scrubbed out and douched, and the uterus was washed out with iodine.

Early on the morning of the 30th the temperature was 104°. The patient had had a bad night and the pulse was over 140. A specimen of blood taken was examined by Dr. Murray of Liverpool, who reported on May 1st that it was sterile. Ten c.cm. of Burroughs and Wellcomes' polyvalent antistreptococcic serum was injected about noon. On May 1st both children developed a mild purulent ophthalmia, which readily yielded to treatment. From May 1st to May 4th the uterine discharge was purulent and extremely foul; the uterus was washed out twice daily with iodine. The temperature ranged from 100.4° to 103°, and the pulse-rate never fell below 130 and was oftener 140. The patient said she felt well; had no headache and no suspicion of a rigor. She took a fair amount of fluid nourishment. She was given about 8 oz. of brandy daily, and for medicine strong doses of tr. ferri perchlor. and quinine. She was restless at night but not sleepless, often having half an hour's consecutive sleep. She was never delirious. Her feeling of wellbeing did not depend on any mental hebetude, as she was throughout perfectly intelligent and alert. On May 4th the uterus was washed out at 11 a.m., the patient, as always, on the back, and the douche only raised about 2 ft. from the bed. The temperature was then 101.6°. At 1.30 she had a most severe rigor; temperature 106°, pulse 152. She had a second injection of 10 c.cm. of the same serum as before. At 3.30 her temperature was 108°, and the pulse, uncountable at the wrist, 180 at the heart. The abdomen was slightly tender all over the lower half and meteorism was very evident; the small intestine being markedly distended. For the first time she said she felt extremely ill. Her clothing was torn down the front and she was packed round with towels, and the front of her body and the whole of her thighs and legs freely sluiced with cold water. In a quarter of an hour the temperature had fallen to 105°; but she complained of extreme illness, said good-bye to all her friends, and expressed herself as conscious that she had not more than a few minutes to live. During the rest of the day the temperature and pulse-rate fell steadily, till at midnight the one was 100.4° and the other 138. During the night she had some sleep and took freely of fluids. By morning the distension of the intestine had entirely disappeared.

On May 5th the temperature never rose above 100° F., and the pulse varied from 124 to 130. She had an egg and toast for breakfast, a mutton chop for dinner, and again said she felt very well.

The rigor and hyperpyrexia followed so immediately on the douche that it was evident that they were due to some escape of fluid through patent Fallopian tubes, so the douching was suspended. From May 5th to 7th there was nothing to record but steady, satisfactory progress, but on the 9th the uterine discharge was so vilely offensive that the uterus was douched again, the height of the douche being only 6 in. However, the same result followed in a minor degree; temperature 1.30 p.m., 103.5° F., pulse 150. Meteorism, though present, was much less pronounced than on the first occasion. Ten c.cm. of serum was given, and at 9.30 temperature was 100.8° F., pulse 128. The following days the temperature and pulse were:

	A.M.	P.M.
May 8th ...	Temp. 99.4°, pulse 122.	Temp. 100.2°, pulse 122.
May 9th ...	Temp. 100°, pulse 127.	Temp. 100.2°, pulse 124.
May 10th...	Temp. 101.2°, pulse 122.	Temp. 101°, pulse 126.

On examination per vaginam there was neither perimetritis nor parametritis; the uterus was involuting well, and there was no vaginal discharge. From the 7th the vagina had been washed out twice daily, but no uterine douche given. A Bondin catheter was passed into the uterus and gently aspirated, but withdrew nothing but a few drops of blood-stained and slightly offensive fluid; 10 c.cm. of serum were given by the mouth.

	A.M.	P.M.
May 11th...	... Temperature 99.6°.	... Temperature 101°.
May 12th...	... Temperature 100°.	... Temperature 102°.

Serum 10 c.cm. injected.

May 13th and 14th the evening temperature was 103° F., and on the 14th a swelling was found on the right buttock, which on incision discharged a small quantity of vile-smelling chocolate-coloured pus.

From that date progress has been steady. She rose from bed on May 31st, and on June 12th went away for a change of air. She reports on June 23rd, "I feel much better, and am enjoying myself fine. I only felt my back aching a bit when I went for a long walk."

The principal points of interest are the immediate onset of infection, which was almost certainly derived from the vagina and carried directly into the uterus on the blades of the forceps (rubber gloves were worn and the forceps on each occasion taken directly out of the water in which they had been boiled); the extraordinarily high fever; the proof afforded by the abscess that the infection was finally generalized, and the extreme value in certain cases of stock polyvalent serums. Polyvalent serums prepared by Parke, Davis, and Co. and the Lister Institute were obtained for use in case the first serum failed, but were not required.

Llandudno. EDWARD GOODDY.

HICCOUGH IN THE COURSE OF DIAPHRAGMATIC PLEURISY TREATED BY LABORDE'S METHOD.

F. S., aged 22 years, a toolmaker by trade, and of marked neurotic temperament, was seized with sudden severe pain in the back whilst at work. When seen later in the day he was evidently in violent pain, which he located at the lower part of the back, over the lumbo-sacral joint; his respirations were hurried and "pleuritic" in type, temperature 102°, and pulse 100. There were no other physical signs until the following morning, when friction sounds were distinctly heard over the basal margin of the left lung for about 3 in. on either side of the mid-axillary line. The pain had left the back, and was now located almost exactly to the region over which the pleural friction was heard. He developed a patch of consolidation in the base of the left lung, and the temperature continued between 102° and 104° for five days, when the crisis occurred, and the temperature dropped to 98°, and subsequently did not rise above the normal. The next day, however, the patient developed occasional distressing hiccough, which became more and more violent and frequent, until in a few hours it occurred with every inspiration. Morphine, by the mouth and subcutaneously, potassium bromide and chloral hydrate, nitro-glycerine, hot brandy, were all in turn tried and found to be useless, as was also "holding the breath." The hiccough continued for four days, stopping only when the patient had occasional snatches of sleep, and reappearing immediately on waking; it prevented his taking sufficient nourishment, and was rapidly bringing him to a state of extreme exhaustion. Finally, Laborde's method was tried. The tongue was seized at the tip between the fingers and pulled forwards, being held in this position for two minutes. The hiccough ceased immediately, and did not reappear for five hours, when a slight attack was treated in a similar manner. Thereafter the symptom did not recur.

The success of the method is possibly purely due to a mechanical cause, the traction on the tongue preventing the abrupt closure of the glottis, which is characteristic of hiccough; though Laborde's own theory that in his method of restoring the apparently drowned the superior laryngeal nerve is reflexly stimulated by the rhythmic traction of the tongue, and the fact that in such cases hiccough is frequently an early sign of the return of normal respiration, suggest that a temporary inhibition of the superior laryngeal nerve by continuous and forcible traction may, in part at any rate, be responsible for the cessation of symptomatic hiccough. FRED T. H. DAVIES, M.B., Ch.B.

Handsworth, Birmingham.

MONOCULAR CONJUNCTIVITIS AND LACRYMAL CONCRETIONS.

An obstinate monocular conjunctivitis always suggests the possibility of some affection of the lacrymal passages, and, in many such cases, pressure over the tear sac will cause some muco-purulent secretion to be expelled from one or both puncta. Constant reinfection of the conjunctiva from an infected lacrymal concretion is a far rarer occurrence.

Dr. George S. Derby[1] states that in 1907 upwards of 50 cases of lacrymal concretion had been published. In only 4 of these was the upper canaliculus involved. Löwenstein had recently added a fifth and Derby reported 2 further examples. The case here appended is yet another instance of the occurrence of concretion in the upper canaliculus.

On February 10th Mrs. X., aged 47, consulted me for a conjunctivitis which had troubled her for a month, at first in both eyes, but persisting only in the right. I found marked bulbar and palpebral congestion and some redness and undue prominence of the upper lacrymal papilla. This latter the patient herself pointed out to me as something red hanging down in the corner of her eye. On pressure over the lacrymal sac, no exudation was expelled, but the prominence of the papilla became more marked, so that it looked as though there were a small cyst immediately beneath the punctum.

Treatment with a lotion of sodium biborate, with protargol and boracic ointment, later supplemented by zinc sulphate drops and a weak ammoniated mercury ointment, was carefully carried out for seven weeks with no permanent effect. There had thus been a continued conjunctivitis of eleven weeks altogether.

The patient now consented to let me slit up the canaliculus, as I had diagnosed an infected lacrymal concretion, acting as a permanent focus of infection. I did so and removed two concretions, each the size of twice an ordinary pin's head. They were of a dirty yellow colour and soft. The first squashed under my finger, as I tested its consistency, but on removal it had a distinct rounded surface, as though it had rubbed continually against the other concretion. The second concretion I examined under the microscope and found an amorphous mass. Both were evidently pieces of inspissated mucus occupying the lumen of the canaliculus, but apparently not completely blocking it, since there was no interference with the passage of tears, and the protargol drops passed freely into the nostril.

A week after removal of the concretion slight improvement was noticed. I syringed through the upper canaliculus, and the lotion passed freely into the nose. A fortnight later the white of the eyeball showed clearly for the first time, and five weeks after the operation the eye was normal.

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Reports
ON
MEDICAL AND SURGICAL PRACTICE IN THE HOSPITALS AND ASYLUMS OF THE BRITISH EMPIRE.

BRADFORD ROYAL INFIRMARY.

A RARE PELVIC TUMOUR.

(By Arthur T. Paterson, M.D.Edin., Resident Surgeon.)
[Under the care of Dr. T. Jason Wood.]

The following case seems to be of rather more than ordinary interest owing to its rarity:

The patient, a widow of 64 years, came to the Bradford Royal Infirmary complaining of pain in the right inguinal region and at the vulva; the pain was especially present after micturition, and the patient felt that she did not pass her water freely. These conditions had prevailed for about six months, and were first noticed after she had done a lot of walking whilst electioneering. There was no haematuria, but occasional scalding, and the urine contained a trace of albumen.

The patient was examined under an anaesthetic, and a firm round swelling, which could be grasped in bimanual examination, found on the right side of pelvis, close to middle line. A sound was passed into uterus, and took the normal direction, thus excluding that organ as being the lump felt.

The patient seemed desirous of undergoing an operation for the relief of her symptoms, so she was admitted as an in-patient, and operated on a few days later, the diagnosis made being that of a small ovarian tumour, or a fibroid with a short pedicle.

Under ether a suprapubic median incision was made: the tumour presented itself at once. It had no connexion with the uterus; this organ was seen to be rather small, otherwise normal; the ovaries also were observed to be healthy. Some doubt existed as to exactly where the tumour was attached and what it was. It rested above and in close proximity to the fundus of the bladder, and shifted its position as the bladder was distended artificially. Obviously now the tumour was seen to be adherent to the anterior surface of the bladder, and most likely had eroded the wall of the latter viscus, since, on opening the tumour and allowing it to discharge a jelly-like substance, a finger inserted through the opening palpated a sound in the bladder.

The tumour was completely evacuated, then dissected off the bladder; the opening in the bladder wall was closed in two layers with catgut sutures. A rubber drainage tube made fast with a stitch was inserted into the prevesical space, as a precautionary measure against leakage, and the abdominal wall repaired layer by layer. A self-retaining catheter was inserted into the urethra. The wound in the abdomen remained dry for three or four days; then urine appeared on the dressing, so a Cathcart's draining apparatus was fitted on to the drainage tube and drained the urine quite satisfactorily, none being passed naturally. The suprapubic opening gradually closed, and in four weeks the Cathcart's apparatus became unnecessary, the patient passing a gradually increasing quantity of water naturally. Four days after removal of the drainage apparatus the suprapubic wound had quite healed, and that day the patient passed 43 oz. of urine naturally and without difficulty.

A few days later she went to the convalescent home at Rawdon, and before leaving I satisfied myself that the wound had quite healed. Patient assured me she no longer had any pain, but still had some feeling of difficulty in emptying the bladder; doubtless this was due to the surgical interference at the time of operation, and would in all probability disappear.

The tumour was considered to be a dermoid, originating probably in connexion with the urachus. On section it was seen to be of two compartments; the uppermost had a somewhat calcified wall and contained caseous matter; the lower and larger compartment had a vascular wall, the interior of which was ridged, and it contained a colloid-like substance; no typically dermoid structures were found within.

The tumour was now sent to Dr. Eurich, the honorary pathologist, who kindly sent the following report: "The walls of the tumour consist of dense, interlacing masses of non-striped muscular fibre. Here and there among this mass of muscle can be seen scattered alveoli lined by columnar epithelium, and containing in their lumen colloid material."

Diagnosis: "Adenomatous myoma, probably developed from urachus."

LONDON HOSPITAL.

A CASE OF MENINGEAL HAEMORRHAGE IN A DIABETIC DUE TO ENDOCARDITIS WITHOUT PHYSICAL SIGNS OF VALVULAR TROUBLE.

(By D. G. Rice-Oxley, M.R.C.S.Eng., L.R.C.P.Lond., House-Physician.)
[Under the care of Dr. Percy Kidd.]

J. P., a man, aged 49. was admitted to the London Hospital on May 23rd, 1910. He complained of twitching movements on the right side of his body, which commenced in the hand, and quickly spread to the arm, face, and leg.

[1] *Archives of Ophthalmology*, November, 1909, p. 581.

He first noticed the movements one week previous to his admission, and they had been getting steadily worse. He had always considered himself a healthy man, and had complained of nothing, except that he noticed for some months past that he was getting thinner. He had been subject also to frequency of micturition, and was always very thirsty.

On admittance he had an air of lassitude, the complexion was somewhat florid, and the eyes were of a bright blue colour. The fits were extremely frequent, coming on about every minute, and lasting about twenty seconds. They involved the whole of the right side of the body, but more especially the arm and face. The convulsions were clonic in character, and the patient did not lose consciousness, or have any incontinence of either urine or faeces during the convulsions.

The skin was dry, the tongue clean and moist. Temperature, 100°; pulse, 102, equal and regular, but the tension was slightly raised. The pupils were equal, and reacted well to light and accommodation. The lungs were clear, and the heart appeared quite normal.

On examination of the urine, it was found to be acid, specific gravity 1038, trace of albumen, and sugar present in large quantities, 6.6 per cent.

The fits became more frequent, and the patient gradually lapsed into a comatose condition, and died three days after admission. A *post-mortem* examination was made which revealed a condition of septic endocarditis and meningeal haemorrhage.

The heart weighed 11 oz., and there were large vegetations, with erosion and considerable thickening of the aortic cusps, and numerous small vegetations on the aortic surface of the mitral valve. The aortic valve was incompetent to the water test. The coronary arteries and aorta showed considerable atheroma. There was also blood clot in the superior frontal sulcus and adjacent portion of the precentral sulcus, touching the genu, on the left side. The ascending frontal convulsion was stained, but there was no disease of brain. The pancreas appeared normal, and weighed 2½ oz. The kidneys were terra cotta.

The case is remarkable because:

1. There were no physical signs or symptoms suggestive of any cardiac valvular trouble.

2. The haemorrhage was meningeal and could not have accounted for the diabetes, which, I suppose, was incidental. The pancreas showed no disease or enlargement.

3. There was no infarction of viscera.

I am indebted to Dr. Percy Kidd for his kind permission to publish this case.

Rebiews.

SURGERY.

THE collection of papers by the late Mr. HAROLD BARNARD, edited by Mr. JAMES SHERREN, and published under the title, *Contributions to Abdominal Surgery*,[1] will impress upon those who had not the advantage of intimacy with the author, or of experiencing the influence of his genial personality and gifts for teaching, the great loss suffered by British surgery in his too early death. The first two hundred and fifty pages embody the published and unpublished materials for a comprehensive work on intestinal obstruction that Mr. Barnard had in view at the time of his death. As it stands, the article forms a monograph that for arrangement, classification, wealth of illustration both from the literature and from the author's large personal experience at the London Hospital, for shrewd reference of signs and symptoms to their pathological and physiological causes, and for the thoughtful application of theoretical considerations to treatment, will lay every future writer under a heavy obligation, and in the meantime will supply students and practitioners alike with an easy road to the perfecting of their knowledge of the subject. It would take us too far to go over the whole essay in detail, but we may instance as an example of the fruits of his statistical research the observation that all cases of intestinal obstruction from simple faecal impaction die if submitted to laparotomy; and to indicate the careful way in which he applied his knowledge of physiology, the suggestion that some cases of chronic ulcerative colitis may be due to a functional failure on the part of the caecum in neutralizing the chyme and its ferments periodically poured into it from the ileum. The second paper in the book is headed "Gastric Surgery," but deals almost exclusively with anatomical and physiological considerations, and is rather a summary of recent additions to existing ideas on the matter than a contribution to the surgery of the stomach. On the other hand, the paper on the simulation of acute peritonitis by pleuro-pneumonic diseases, illustrated by six cases, and discussing the criteria for diagnosis, will be read with great profit and no little interest by all who do abdominal surgery, and, indeed, by all those who see acute cases. There is probably not quite such general ignorance of the possibility of this simulation as the deficiencies of the textbooks lead Mr. Barnard to assume. There must be few hospitals where it is not the subject of a clinical lecture from time to time both by physician and surgeon, but everybody is liable to be caught napping, and nobody will be the worse for this reminder. He does not, perhaps, make it quite clear that in some, at least, of these cases there is a pneumonic peritonitis of mild type in association with, or preceding, the pleural or pulmonary lesion. The three lectures on acute appendicitis which follow do not betray, and their more fugitive character doubtless is the reason, quite the same considered judgement as the first essay. The author, moreover, was upon debatable ground. He was not an out-and-out advocate of early operation. He knew, of course, that cases operated upon within the first twenty-four hours stood the best chance, but he was only too conversant, like most hospital surgeons, with cases seen for the first time on the third or fourth or fifth or later days, and he knew the danger of the "third day." It is curious, however, that familiar as he was with the remarkable virtures of massive saline infusion in the treatment of general peritonitis, he did not, apparently, realize its influence in inhibiting the onset of spreading peritonitis in circumstances in which spread might reasonably be anticipated, nor the immunity it affords a patient when submitted to an operation involving exposure otherwise dangerous. The last contribution needs no elaborate notice, for the paper read before the Surgical Section of the Royal Society of Medicine on subphrenic abscess made so great an impression at the time, and has been used already by so many other writers, that his conclusions must be widely known. Suffice it to say that, in Mr. Sherren's words, it "has done much to clarify our ideas on what is one of the most difficult subjects in this branch of surgery; careful perusal of this work, putting into practice its teachings, will be the means of saving many lives." It would not be right to omit reference to the care and skill with which the editor's task has been performed. No doubt it was a labour of love, but it is not an easy matter to collate another man's manuscript and to dovetail fragments into such a symmetrical sequence as is here accomplished. The illustrations, of which there are many, do not a little to increase the value of a book that will not need the pathetic but adventitious aid attaching to a memorial publication to secure a large sale and wide appreciation.

MR. MOYNIHAN'S monograph on *Duodenal Ulcer*[2] is a solid contribution to surgical literature written in the finished style we are now accustomed to expect from his pen. A hard worker himself, Mr. Moynihan knows how to elicit the best efforts of his assistants, and he spares no trouble to enlist aid far and wide. Thus it is he is able to give an account of duodenal ulcer which represents not only his own very large experience but a research in the library, and, what is more important, in hospital records and museums. Every section of his book is illustrated by detailed case reports the ollection of which must represent in the aggregate an enormous expenditure of time. It is interesting to find from the short historical introduction that we need go no further back than 1817 to find the earliest mention of duodenal ulcer, and that the first case in which the diagnosis was made and verified was by Wunderlich in 1845. The second chapter

[1] *Contributions to Abdominal Surgery.* By the late H. L. Barnard, M.S., F.R.C.S. Edited by James Sherren, F.R.C.S. London: Edward Arnold. 1910. (Med. 8vo, pp. 411; illustrated. 15s.)

[2] *Duodenal Ulcer.* By B. G. A. Moynihan. London and Philadelphia: W. B. Saunders Company. 1910. (Crown 8vo, pp. 378; illustrated. 18s.)

deals with the vexed question of ulcers following burns. Curling's cases and a good many others are here illustrated; it is stated that the lesion "is doubtless a toxic ulcer, and therefore analogous to the ulcer which occurs in septicaemia, uraemia, typhoid fever, erysipelas, and pemphigus." This, however, does not advance the matter very far, nor does it explain the entire absence of any such occurrence amongst very large series of necropsies made by first-rate observers. In the next section uraemic ulcers receive attention, and details of 27 cases are given. There seems to be some experimental evidence to support the view that the duodenum is the most efficient path for the excretion of urinary poisons. Submucous haemorrhages are frequently found in association with ulcers, and it is possible that the ulceration begins at the site of effused blood and is determined by the action of the gastric juice immediately beyond the pylorus. Tuberculous ulcer is not very uncommon, for Mr. Moynihan is able to transcribe 34 case reports. It is rarely, however, that symptoms call for operation; two only have occurred in his own practice. There is an interesting chapter on melaena neonatorum and duodenal ulcer. No less than thirty instances are furnished. Landau's view, supplemented by Helmholz, was that the incidence was "due to thrombosis of the umbilical vein; thrombi were carried thence into the general circulation and were deposited in various organs." The digestive action of the gastric juice came into play in the case of the duodenal infarcts. These cases, therefore, form an interesting sidelight on "burn" and other "toxic" ulcers. When the author reaches his main thesis—chronic duodenal ulcer—the reader will find himself on familiar ground, for much that is printed here has appeared in one form or another in current literature in the last two or three years. He will not be surprised to meet such a sentence as this: "It is therefore not necessary to the attaining of an accurate diagnosis that any examination of the patient be made. The anamnesis is everything; the physical examination is relatively nothing." Again, "Recurrent severe 'hyperchlorhydria' *is* duodenal ulcer"; and again, persistent hyperchlorhydria "is the medical term for the surgical condition duodenal ulcer." These are questions that the author must be left to fight out with the physicians, and there is no doubt that he will give a very good account of himself. We suspect that when by his dramatic statements he has compelled a very considerable degree of admissions from his opponents, he will be the first to admit that in matters medical assertions couched in such uncompromisingly dogmatic terms imply exceptions. Whatever the upshot of the difference of opinion, there is the solid evidence of a series of 189 operations by one surgeon within nine years for a condition that has only been known for a century, and was first diagnosed *intra vitam* little more than half a century since. Moreover, it appears from Mr. Collinson's tabulated statements of these cases, that in every instance of ulcer, recognized on evidence that would have led physicians to diagnose some such state as "acid dyspepsia," an ulcer has been found in the duodenum which could be demonstrated, upon the exterior of the gut, to those looking on at the operation. In another aspect of this surgical record there is ground for congratulation. There is an operative mortality of but 2.15 per cent., and recent reports enable the figures for cures, as distinct from recoveries, to be put at 79 per cent. The treatment of chronic duodenal ulcer needs no reference, for it has become part of the routine of every operating surgeon; but there will be no grudging Mr. Moynihan a large share of the merit for pioneer work that has made such a state of things possible. The illustrations, both of specimens and of the stages of the operations, are alike very good.

The course of surgical operations[3] prescribed by Professor SCHMIEDEN for his students and for practitioners is set out in extremely pleasant fashion. The author has hit off in the happiest fashion just the line between a manual solely for use in the dead-house—though he indicates an intention for the dead-house by putting upon his title-page the words, "Mortui vivos docent"—and a treatise on operative surgery. That is to say, that, although he describes nothing that cannot be practised upon the dead body, and refrains from anything more in the way of selective indication than the general principle "the simpler the better," yet, in the wording of the directions, there is evident throughout the constant thought of the operating theatre, the direct application of what is being learnt upon the dead to technical perfection in operating upon the living. It is a book not for a student going up for an examination, but for the budding surgeon. The style is quite simple, and the illustrations generally very good. There is no attempt to teach anatomy; students would not find here anything to compare with the diagrams in such a book as Allingham's for assisting a flagging anatomical memory, but for one who knows his anatomy as he ought, there is ample in this text. Like most Continental authors, Professor Schmieden shows a fondness for osteoplastic amputations; he prefers a Pirogoff to a Syme, for instance. He knows the value of the circular amputation in the lower third of the thigh, but, unfortunately, his illustrations of the circular method are indifferent; almost the only indifferent ones in the book. Except upon the recently dead body, catheterization cannot be taught satisfactorily in the dead-house, but perhaps it is right to include mention of it. We have read no book of its size more suitable for use by a class in operative surgery, and it is just about the right size.

The second edition of Mr. WHEELER'S *Student's Handbook of Operative Surgery*[4] is decidedly an improvement on the first, but the limitations indicated in our review of the first edition still subsist. Textbooks on this subject are gradualy becoming "modernized." The courses given in the schools have long since become so. Whilst amputations, excisions, and ligature of arteries in continuity retain their pristine importance, the extended field of surgery has brought scores of other operations into equal prominence, and all, or almost all, are practised on the dead body. This, however, is, as the name indicates, a manual purely for students, and the operative class is largely an anatomical exercise for them. It is therefore a little unwise, as it seems to us, to keep the volume small by minimizing the anatomical data and diagrams. The text is notably free from errors, but it is not the book to be read for the examinations taken by the majority of English students.

In committing to print the accumulated experience of many years' teaching and operative experience, Professor PELS-LEUSDEN has modestly disclaimed the title "Operative Surgery," and sought to indicate, in the subtle way possible in the German language, just the nuance of meaning which English readers will associate with the operations of surgery,[5] and in consequence this book must challenge comparison with Mr. Jacobson's well-known work. The intention here has not been to compile an encyclopaedia of operations, but to provide a working account of those in most common use and something by way of indications as to the respective merits of the different procedures, together with the reasons for selecting a particular method upon a particular occasion. It is a sound guide to the practice of five years ago, and perhaps that is what a textbook ought to be. Certainly it is no reflection upon Professor Pels-Leusden to say this. He is sufficiently up-to-date to include an account of Trendelenburg's operation upon the pulmonary artery for embolism; he describes many of the recent developments in operative work upon the thorax and upon the vessels; he has had the energy to secure a set of illustrations almost entirely new; finally he exhibits the sane judgement and practical common sense which make him a safe guide to those who read and rely upon his pages when gaining their own operative experience. The line and wash drawings by Dr. Muller are quite good; his insets to show anatomical details in projection and section are delicate little pieces of work and extremely useful. Where the author has considered an operation not of sufficient frequency to warrant description in detail, he has given plenty of references to recent cases. Such is the case, for example, with exposure of the pituitary body for the removal of tumours. The section

[3] *Der chirurgische Operationskursus.* Von Professor Dr. Victor Schmieden. Leipzig: J. A. Barth. 1910. (Sup. roy. 8vo, pp. 342; illustrations 354. M.13.50.)

[4] *Student's Handbook of Operative Surgery.* By W. I. de C. Wheeler, M.D., F.R.C.S.I., Surgeon to Mercer's Hospital, Dublin. London: Baillière, Tindall, and Cox. 1910. (Cr. 8vo, pp. 310; illustrations 157. 7s. 6d.)

[5] *Chirurgische Operationslehre für Studierende und Aerzte.* Von Professor Dr. F. Pels-Leusden. Berlin and Vienna: Urban and Schwarzenberg. 1910. (Sup. roy. 8vo, pp. 744; 668 illustrations. M.18.)

dealing with abdominal surgery is not quite satisfying. Probably the reader is a little biassed by some of the early sentences. In the after-treatment of abdominal cases Professor Pels-Leusden is dreadfully afraid of purgation. If the bowels have not acted by the fifth day, an enema may be ventured upon! It is not surprising to find him referring to the passage of flatus as "heavenly music" both for the patient and the doctor! An emasculated Murphy method of rectal saline infusion is described and attributed to Katzenstein. In dealing with intestinal anastomosis the author shows a fondness for mechanical apparatus of the Murphy-button type, and a reluctance to employ lateral anastomosis that is surely more than five years out of date. He gives very good figures of the Borelius method of implanting the ureters and trigone of an ectopic bladder into a partially segregated loop of sigmoid. In the account of suprapubic prostatectomy it is advised to preserve the urethra by careful dissection with scissors, and to complete the operation by an equally careful suture of the divided mucosa at the base of the bladder. We cannot help thinking this is one of the operations of which the author says in his preface that if he has not had experience of them in the theatre he has performed them upon the cadaver. There is evidence, too, of a persistent liking for transfixion amputations. There seems to be very little that is new in the book, but there is singularly little that is not good of its kind. One slip will doubtless be corrected in another edition—namely, the figures of the larynx on pages 353–4, which are quite puzzling until one realizes that the cartilages have turned their backs on the trachea. A useful if not a very attractive book.

The English student will have no temptation to turn to the German work, for books of the same class, a little better done, are to be had in his own tongue. For example, the second volume of the *Manual of Operative Surgery*,[6] which Mr. HUTCHINSON has rewritten for TREVES, is now available, and bears out all that we said in reviewing the first volume (BRITISH MEDICAL JOURNAL, April 2nd, 1910, p. 814). The second volume includes operations on the head, neck, and spine, upon the thorax and breast, upon the vessels and nerves; amputations, operations on bones and joints, upon tendons and fasciae. Mr. Hutchinson is a very cautious, and by no means too sanguine, guide. Most surgeons have periods of depression when they review their results in operations for brain tumours, for cancer of the breast and tongue, and in operations upon nerves. A torn brachial plexus is not a very hopeful field for suture or anastomosis, but there are enough good results to save the attempt from damnation by faint praise. Of course there are failures in anastomosis for facial palsy, but there are lots of successes; true, in this country, operations for exophthalmic goitre are not favourably received, but what about the work of the Mayos? If so few operations for cerebral tumours result in cures, at least it would have been worth while to include an account of Cushing's decompressive operations. Operations upon vessels may be in the experimental stage, but a fair number of operations in the human subject is now on record, and a student will naturally expect his work on operative surgery to say something about the subject. It is strange in these days to have to say of a book that there are not enough illustrations, but the selection here is not quite up to the mark; figures of instruments are showered upon every operator in enormous volumes by the makers, but in such a complicated point as the fashioning of flaps from the cartilaginous meatus to line the bare mastoid cavity, the young surgeon will be very grateful for figures and diagrams. One little correction, and we have done grumbling. The special trocar and cannula devised for empyemata was suggested, we believe, not by Mr. G. B. Turner, but by Mr. William Turner. There are very few operations, or special points about operations in general daily use, for which the reader will not be able to turn with confidence to this book. He will be able to refresh his memory about anatomical details, about instruments, and about difficulties and dangers likely to be encountered. He will find his information well displayed and well printed, readily accessible, and clearly expressed.

[6] *A Manual of Operative Surgery.* By Sir Frederick Treves and Jonathan Hutchinson. Third edition, vol. ii. London: Cassell and Co. 1910. (Royal 8vo, pp. 828. Plates 16, illustrations 495. 36s.)

The appearance of a second edition of SLUSS's *Emergency Surgery*[7] within a year of the first publication is sufficient indication of the appreciation this compact little book has won. A new chapter on the general technique of laparotomy does little to advance the author's express purpose, but, on the other hand, the additional matter includes a brief account of pericardiotomy, of spinal anaesthesia, and of the important subject subphrenic abscess. It is, we think, hardly fair to attribute the clarification of our ideas in this respect to Guibal. The late Mr. Harold Barnard deserves the credit. We feel obliged to protest, too, against the instruction to put hot-water bottles to the feet of a patient recovering from anaesthesia, unless it be definitely intimated that very ample covering is essential. Still, these are minor matters, and the book has proved its usefulness.

NOTES ON BOOKS.

SLEEPING SICKNESS.

DR. HEARSEY reports on sleeping sickness in the Nyasaland Protectorate on June 15th, 1910, this being found in Part X[8] of his diary which is published from time to time. Since the issue of the last memorandum there is little of interest to record. The discovery recently made by Dr. Leach of several cases of sleeping sickness in North Eastern Rhodesia, in the basin of the Luangwa river, and in the absence—so far as yet ascertained—of *Glossina palpalis* either on the Luangwa or its tributaries, has necessarily not a little significance for Nyasaland; more especially when it is recollected that in the majority of the Nyasaland cases it has also not been possible to associate the infections with *Glossina palpalis* as the causative factor. A brief summary of these cases is then given, the information being based on reports furnished by the Acting Administrator of North-Eastern Rhodesia. As a search is now being made for *Glossina palpalis* in the neighbourhood of the confluence of the Luangwa and Zambesi rivers by a medical officer accompanied by an entomologist, some definite information may be obtained. The fact of a fresh case of trypanosomiasis being found within a few miles of Zomba would seem to point to the deduction that the disease is a much more widespread one than is generally supposed, and that numerous cases must be going about at present undetected.

The first edition of 10,000 copies of M.D.'s volume on *Ideal Health*[9] having been exhausted, it may be assumed that it was appreciated, and that the second edition, recently issued in a revised form, is called for. But for the fact that the author, who conceals his identity under a *nom-de-guerre*, categorically states in the preface to his first edition that he derives "absolutely no advantage, pecuniary or otherwise, from any of the articles or apparatus recommended in these pages," one would be inclined to regard the volume as a mere trade advertisement to promote the sale of "spring chest expanders," "spring exercisers," and suchlike special varieties of apparatus provided to promote the culture of physical development. While we have no fault to find with the manner in which the knowledge and teaching it contains are conveyed, we are not at all sure that, even under cover of anonymity, a member of the medical profession is wise, however altruistic he may be, to promote by his advocacy the sale of this, that, or the other form of mechanical contrivance which is promoted, put upon the market, and puffed after the usual methods of commerce.

[7] *Emergency Surgery for the General Practitioner.* By John W. Sluss A.M., M.D. Second edition. London: Rebman, Limited. 1910. (Demy 8vo, pp. 762; 605 illustrations. 15s.)

[8] *Nyasaland Protectorate: Sleeping Sickness Diary.* Part X. By the Principal Medical Officer. Zomba: Printed by the Government Printer. 1910.

[9] *Ideal Health: How to Attain it by Physical Culture.* By M.D. Second edition. Bristol: John Wright and Sons, Limited; and London: Simpkin, Marshall, Hamilton, Kent, and Co., Limited. 1909. (Cr. 8vo, pp. 123; illustrations from life. 1s.)

THE annual meeting and dinner of the Caledonian Medical Society will be held at Fort William, on Friday, September 23rd. The chair will be taken by Dr. A. Cameron Miller, of Fort William.

THE Annual Welsh Medical Dinner will be held under the presidency of Mr. Robert Jones (Liverpool), at 7.30 p.m., on Friday, September 30th, at the Criterion Restaurant, Piccadilly, London, W. Applications for tickets should be made at an early date to the Honorary Secretary, Mr. J. Howell Evans, 25, Berkeley Square, W.

BRITISH ASSOCIATION.

THE eightieth annual meeting of the British Association for the Advancement of Science was opened at Sheffield on August 31st, under the presidency of Professor BONNEY, who took as the subject of his address the Ice Age in Western Europe. We are enabled by the courtesy of the Assistant Secretary, Mr. O. J. R. Howarth, M.A., to give summaries of the chief communications which are of interest, directly or indirectly, to medical readers.

SECTION OF PHYSIOLOGY.

The Nature of Life.

Professor A. B. MACALLUM, President of the Section of Physiology, delivered an address on the nature of life. He said the record of investigation of the phenomena of the life of animal and vegetable cells for the last eighty years constituted a body of knowledge of imposing magnitude and of surpassing interest to all who are concerned in the studies that bear on the organic world. This body of knowledge, which was called cytology, was still, with all this achievement, in one respect an undeveloped science. It was almost wholly concerned with the structural or morphological side of the cell, while of the functional phenomena our knowledge was only of the most general kind, and the reason was not far to seek. What little was known of the physiological side of the cell—as, for example, of cellular secretion, absorption, and nutrition—had only to a very limited extent been the outcome of observations directed to that end. It was in very great part the result of all the inferences and generalizations drawn from the data of morphological research. This state of our knowledge had fashioned our concept of living matter. When we thought of the cell it was idealized as a morphological element only. The functional aspect was not ignored, but we knew very little about it, and we veiled our ignorance by classing its manifestations as vital phenomena. It was true that in the last twenty years, and more particularly in the last ten, we had gathered something from biochemical research. We knew much concerning ferment or catalytic action, of the physical characters of colloids, of the constitution of proteins, and their synthesis in the laboratory promised to be an achievement of the near future. We were also in a position to understand a little more clearly what happened in proteins when, on decomposition in the cell, they yielded the waste products, urea, and other metabolites, with carbon dioxide and water. Further, fats could be formed in the laboratory from glycerine and fatty acids, a large number of which had also been synthesized, and a very large majority of the sugars of the aldohexose type had been built up from simpler compounds. These facts indicated that some of the results of the activity of animal and vegetable cells might be paralleled in the laboratory, but that was as far as the resemblance extended. The methods of the laboratory were not as yet those of Nature. Nature worked unerringly, unfalteringly, with an amazing economy of material and energy, while "our laboratory syntheses were but roundabout ways to the waste sink." In consequence, it was customary to regard living matter as *sui generis* without an analogue or parallel in the inorganic world, and the secrets involved in its actions and activities as insoluble enigmas. Impelled by this view, there were those, also, who postulated as an explanation for all these manifestations the intervention in so-called living matter of a force otherwise and elsewhere unknown, biotic or vital, whose action was directed, according to the character of the structure through which it operated, to the production of the phenomena in question. Living protoplasm was, in this view, but a mask and a medium for action of the unknown force. This was an old doctrine, but it had again made headway in recent years owing to the reaction from the enthusiasm which came from the belief that the application of the known laws of physics and chemistry in the study of living matter would explain all its mysteries. A quarter of a century ago hopes were high that the solution of these problems would soon be found in a more profound comprehension of the laws of the physical world. Since then there had been an extraordinary increase in our knowledge of the structure and of the products of the activity of living matter without a corresponding increase in knowledge in the processes involved. The obscurity still involving the latter appeared all the greater because of the high lights thrown on the former. Despair, in consequence, had taken the place of hope with some, and the action of a mysterious force was invoked to explain a mystery. It might be admitted that our methods of investigation were very inadequate, and that our knowledge of the laws of matter, seemingly comprehensive, was not at present profound enough to enable us to solve all the problems involved in the vital phenomena. The greatest factor in the difficulty of their solution, however, had been the fact that there had been a great lack of investigators specially trained not only in biology, but also in physics and chemistry, for the very purpose of attacking intelligently such problems. The biologists, for want of such a wide training, had emphasized the morphological aspect and the readily observable phenomona of living matter; while the physicist and chemist, knowing little of the morphology of the cell and of its vital manifestations, had been unable to apply satisfactorily the principles of their sciences to an understanding of its processes. The high degree of specialism which certain departments of biology had in recent years developed had made that difficulty still greater. It must also be said that in some instances in which the physicist and chemist attempted to aid in the solution of biological problems the result on the whole had not been quite satisfactory. For example, in the phenomena of osmosis, the application of Arrhenius's theory of ionization and van 't Hoff's gas theory of solutions promised at first to explain all the processes and the results of diffusion through animal membranes. These theories were supported by such an array of facts from the side of physics and physical chemistry that there appeared to be no question whatever regarding their universal validity, and their application in the study of biological phenomena was urged with acclaim by physical chemists and eagerly welcomed by physiologists. The result in all cases was not what was expected. Diffusion of solutes, according to the theories, should, if the membranes were permeable to them, always be from the fluid where their concentration was high to that in which it was low. This appeared to happen in a number of instances in the case of living membranes, but in one signal instance at least the very reverse normally obtained. In the kidney, membranes formed of cells constituting the lining of the glomeruli and the renal tubules separated the urine, as it was being formed, from the blood plasma and the lymph circulating through the kidney. Though the excreted fluid was derived from the plasma and lymph, it was usually of much greater osmotic concentration than the latter. It might be urged that this and other discrepancies were explained by the distribution (or partition) coefficient of the solutes responsible for the greater concentration of the product of excretion, these solutes being more soluble in the excreted medium than in the blood plasma, and distributing or diffusing themselves accordingly. If such a principle were applicable here as an explanation, it might be quite as much so in other physiological cases in which the results were supposedly due only to the forces postulated in the theories of van 't Hoff and Arrhenius. Whether this were so or not, the central fact remained that the enthusiastic hopes with which the theories were applied by physiologists and biologists in the explanation of certain vital phenomena had not been wholly realized. The result had been a reaction amongst physiologists and biologists which had not been the least contributory of all the causes that had led to the present revival of vitalism. Another difficulty in accounting for the vital phenomena had been due, until recently, to a lack of knowledge of the physical and chemical properties of colloids and colloidal "solutions." The importance of this knowledge consisted in the fact that protoplasm, "the physical basis" of life, consisted mainly of colloids and water. Till eleven years ago what was known regarding colloids was derived chiefly from the researches of Graham (1851–62), Ljubavin (1889), Barus and Schneider (1891), and Linder and Picton (1892–97), who were the pioneers in this line. In 1899 were published the observations of Hardy, through whose investigations very great progress in our knowledge of colloids was made. In 1903 came the invention of the ultramicroscope by Siedentopf and Zsigmondy, by which the suspension character of colloid material in its so-called "solutions" was visually demonstrated. During the last seven years a host of

workers had by their investigations greatly extended our knowledge of the physical and chemical properties of colloids, and now the science of collochemistry bid fair, the more it developed, to play a very important part in all studies bearing on the constitution and properties of living matter. Then, also, there were the phenomena of surface tension. This force, the nature of which was first indicated by Segner in 1751, and described with more detail by Young in 1804 and La Place in 1806 in the exposition of their theories of capillarity, was first in 1869 only casually suggested as a factor in vital processes by Engelmann. Since the latter date and until 1892, when Bütschli published his observations on protoplasmic movement, no serious effort was made to utilize the principle of this force in the explanation of vital phenomena. Even to-day, when we knew more of the laws of surface tension, it was introduced only as an incidental factor in speculations regarding the origin of protoplasmic movement and muscular contraction, and yet it was the most important of all the forces concerned in the life of animal and vegetable cells. It might be gathered from what he had said that the chief defect in biological research had been, and was still, the failure to apply thoroughly the laws of the physical world in the explanation of vital phenomena. Because of this too much emphasis was placed on the division made between the biological and the physical sciences. That division was very largely an artificial one, and it would in all probability be maintained eventually only as a convenience in the classification of the sciences. The biologist and physiologist had to deal with problems in which a wide range of knowledge was necessary for their adequate treatment; and, if the individual investigator had not a very extensive training in the physical sciences, it was impossible for him to have at his command all the facts bearing on the subject of his research, unless the problem involved were a very narrow one. This growing defect in the biological sciences could be lessened only by the insistence of those in charge of advanced courses in biological and physiological laboratories that only they whose training was of a very wide character should be allowed to take up research. It was, perhaps, futile to expect that such a rule would ever be enforced, for in the keen competition between universities for young teachers who had made some reputation for original investigation there might not be too close a scrutiny of the qualifications of those who offered themselves for post-graduate courses. There was, further, the difficulty that the heads of scientific departments were not desirous of limiting the output of new knowledge from their laboratories by insisting on the wider training for the men of science who were in the process of developing as students of research. It was perhaps true, also, that there still remained a great deal unobserved or unrecorded in the fields of biology, physiology, and bio-chemistry, in the investigation of all of which a broad training was not specially required to give good service; and that, further, this condition would obtain for one or two decades still. It was quite as certain, however, that the returns from such service would tend to diminish in number and value, and, if the coming generation of workers were not recruited from a systematically and broadly trained class of students, a period of comparative sterility might supervene. As it was to-day, there were few who devoted themselves to the direct study of the chemical and physical properties of the cell, the fundamental unit of living matter. There were, of course, many who were concerned with the morphology of the cell, and who employed in their studies the methods of hardening and staining which had been of very great service in revealing the structural as well as the superficial chemical properties of the cell. On the facts so gained views were based which dealt with the chemistry of the cell, and which were more or less widely accepted, but the results and generalizations drawn from them gave us but little insight into the chemical constitution of the cell. We recognized in the morphologist's chromatin a substance which had only in a most general way an individuality, while the inclusions in the nucleus and the cytoplasm, on whose distinction by staining great emphasis was laid, could only in a most superficial way be classified chemically. The results of digestion experiments on the cell structures were also open to objection. The action of pepsin and hydrochloric acid must depend very largely on the accessibility of the material whose character was to be determined. If there were membranes protecting cellular elements, pepsin, which was a colloid, if it diffused at all, must in some cases at least penetrate them with difficulty. In *Spirogyra*, for example, the external membrane formed of a thick layer of cellulose was impermeable to pepsin, but not to the acid; and, in consequence, the changes which occurred in it during peptic digestion were due to the acid alone. Even in the cell whose periphery was not protected by a membrane, the insoluble colloid material at the surface served as a barrier to the free entrance of the pepsin. It was, however, more particularly in the action on the nucleus and its contents that peptic digestion failed to give results which could be regarded as free from objection. Here was a membrane which during life served to keep out of the nucleus not only all inorganic salts but also all organic compounds, except chiefly those of the class of nucleo-proteins. That such a membrane might, when the organism was dead, be permeable to pepsin was at least open to question, and in consequence what was seen in the nucleus after the cell had been acted on by pepsin and hydrochloric acid could not be adduced as evidence of its chemical or even of its morphological character. The results of digestive experiments on cells were, therefore, misleading. What might from them appear as nucleo-protein might be anything but that, while, if the pepsin penetrated as readily as the acid, there should be left not nucleo-protein, but pure nucleic acid, which should not stain at all. The objections he now urged against the conclusions drawn from the results of digestion experiments had developed out of his own observations on yeast cells, diatoms, *Spirogyra*, and especially the blue-green algae. The latter were, as was *Spirogyra*, encased in a membrane which was an effective barrier to all colloids. When, therefore, threads of *Oscillaria* were subjected to the action of artificial gastric juice, a certain diminution in volume was observed owing to the dissolving power of the hydrochloric acid, and an alteration of the staining power of certain structures was found to obtain, but the pepsin had nothing to do with these, as might be determined by examination of control preparations treated with a solution of hydrochloric acid alone. It was thus seen how slender was our knowledge of the chemistry of cells derived from staining methods and from digestion experiments. That, however, had not been the worst result of our confidence in our methods. It had led cytologists to rely on these methods alone, to leave undeveloped others which might have thrown great light on the chemical constitution of the cell, and which might have enabled us to understand a little more clearly the causation of some of the vital phenomena. It was the futility of some of the old methods that led him, twenty years ago, to attack the chemistry of the cell from what appeared to him a correctly chemical standpoint. It seemed to him then, and it appeared as true now, that a diligent search for decisive chemical reactions would yield results of the very greatest importance. In the interval he had been able to accomplish only a small fraction of what he hoped to do, but he thought the results had justified the view that, if there had been many investigators in this line instead of only a very few, the science of cyto-chemistry would play a larger part in the solution of the problems of cell physiology than it now did. The methods and the results, though meagre, showed distinctly indeed that the inorganic salts were not diffused uniformly throughout the cell; that in vegetable cells they were rigidly localized, while in animal cells, except those devoted to absorption and excretion, they were confined to specified areas in the cell. Their localization, except in the case of inorganic salts of iron, was not due to the formation of the precipitates, but rather to a condition which was the result of the action of surface tension. That seemed to him to be the only explanation for the remarkable distribution, for example, of potash salts in vegetable cells. We knew that, except in the chloroplatinate of potassium and in the hexanitrite of potassium, sodium and cobalt, potassium salts formed no precipitates; and yet, in the cytoplasm of vegetable cells, the potassium was so localized at a few points to appear at first as if it were in the form of a precipitate. In normal active cells of *Spirogyra* it was massed along the edge of the chromotophor, while in the mesophyllic cells of leaves it was condensed in masses of the cytoplasm, which were by no

means conspicuous in ordinary preparations of those cells. This effect of surface tension in localizing the distribution of inorganic salts at points in the cytoplasm would explain the distribution of potassium in motor structures. In striated muscle the element was abundant in amount, and was confined to the dim bands in the normal conditions. The distribution of a salt in such a fluid, whether it lowered surface tension or increased it, was due to the action of a law which might be expressed in words to the effect that the concentration in a system was so adjusted as to reduce the energy at any point to a minimum. Our knowledge of this action of inorganic or organic substances on the surface tension in a fluid and of the differences in their concentrations throughout the latter was contained in the results of the observations on gas mixtures by J. Willard Gibbs published in 1878. The principle as applied to solutions was independently discovered by J. J. Thomson in 1887. It was known as the Gibbs principle, although the current enunciations of it contained the more extended observations of Thomson. As formulated usually it was more briefly given, and its essential points might be rendered in the statement *that when a substance on solution in a fluid lowers the surface tension of the latter the concentration of the solute was greater in the surface layer than elsewhere in the solution; but when the substance dissolved raised the surface tension of the fluid, the concentration of the solute was least in the surface layers of the solution.* After dealing in considerable detail with the effects of surface tension, Professor Macallum went on to say that enough had been advanced to indicate that surface tension was not a minor feature in cell life. He would go further and say that the energy evolved in muscular contraction, that also involved in secretion and excretion, the force concerned in the phenomena of nuclear and cell division, and that force also engaged by the nerve cell in the production of a nerve impulse, were but manifestations of surface tension. On this view the living cell was but a machine, an engine, for transforming potential into kinetic and other forms of energy, through or by changes in its surface energy.

He then discussed surface tension in nerve cells and nerve fibres. The very fact that in the repair of a divided nerve fibre the renewal of the peripheral portion of the axon occurred through a movement—a flowing outward, as it were—of the soft colloid material from the central portion of the divided fibre was, in itself, a strong indication that surface tension was low here and high on the cell body itself. This fact did not stand alone. He pointed out six years ago that potassium salt was abundant along the course of the axon and apparently on its exterior surface, while it was present but in traces in the nerve cell itself. In the latter chlorides were present only in traces, and therefore sodium, if present, was there in more minute quantities, while haloid chlorine was abundant in the axon. The conclusions that followed were not far to seek. They knew that an electrical displacement or disturbance of ever so slight a character occurring at a point on the surface of a drop lowered correspondingly the surface tension at that point. What a nerve impulse fundamentally involved we were not certain, but we did know that it was always accompanied by, if not constituted of, a change of electrical potential, which was as rapidly transmitted as was the impulse. When this change of potential was transmitted along an axon through its synaptic terminals to another nerve cell, the surface tension of the latter must be lowered to a degree corresponding to the magnitude of the electrical disturbance produced, and, in consequence, a slight displacement of the potassium ions would occur at each point in succession along the course of its axon. This displacement of the ions as it proceeded would produce a change of electrical potential, and thus account for the current of action. The displacement of the ions in the axon would last as long as the alteration of surface tension which gave rise to it, and this would comprehend not more than a very minute fraction of a second. Consequently, many such variations in the surface tension of the body of the nerve cell would occur in the second; and, as the physical change concerned would involve only the very surface layer of the cell, a minimum of fatigue would result in the cell, while little or none would develop in the axon. It might be pointed out that in medullated nerve fibres the lipoid-holding sheath, in close contact as it was with the axon, must of necessity maintain on the course of the latter a surface tension low as compared with that on the nerve cell itself, which, as the synaptic relations of other nerve cells with it postulate, was not closely invested with an enveloping membrane. In non-medullated nerve fibres the simple enveloping sheath might function in the same manner, and probably, if it was not rich in lipoid material, in a less marked degree. In bringing his address to a close, Professor Macallum said that in applying the laws of surface tension in the explanation of vital phenomena he was proceeding along a path into the unknown which had been as yet only in a most general way marked out by pioneer investigators, and in consequence, to avoid mistakes, he had been constrained to repress the desire to make larger ventures from the imperfectly beaten main road. Perhaps, after all, he might have fallen into error. It was a far cry to certainty. As Duclaux had aptly put it, the reason why science advanced was that it was never sure of anything. Notwithstanding this inadequate treatment of the subject of surface tension in relation to cellular processes, he hoped he had made it in some measure clear that the same force which shaped the raindrop or the molten mass of a planet was an all-important factor in the causation of vital phenomena. Some of the latter might not thereby be explained. We did not as yet know all that was concerned in the physical state of solutions. The fact ascertained by Rona and Michaelis, that certain sugars, which neither lowered nor appreciably raised surface tension in their solutions, condensed or were absorbed on the surface of a solution system, was an indication that there were at least some problems with a bearing on vital phenomena yet to solve. Nevertheless, what we had gained from our knowledge of the laws of surface tension constituted a distinct step in advance, and a more extended application of the Gibbs-Thomson principle might throw light on the causation of other vital phenomena. To that end a greatly developed science of microchemistry was necessary.

Anaesthetics.

The committee, consisting of Dr. A. D. Waller (Chairman), Dr. F. W. Hewitt (Secretary), Dr. Blumfeld, Mr. J. A. Gardiner, and Dr. G. A. Buckmaster, appointed to acquire further knowledge, clinical and experimental, concerning anaesthetics—especially chloroform, ether, and alcohol—with special reference to deaths by or during anaesthesia, and their possible diminution, presented their second interim report. It was stated that the committee had held seven laboratory meetings during the past year, at which apparatus for the graduated administration of chloroform and of ether had been examined and discussed, and experiments made therewith upon animals. In addition to such formal experiments in the presence of the full committee, many additional experiments had been made and reported to the committee:

1. On the graduated administration of chloroform vapour.
2. On the graduated administration of ether vapour.
3. On the effects upon the course of anaesthesia of diminution and augmentation of the percentage of oxygen in inspired atmosphere.
4. On the amounts of chloroform present in the blood and in the nervous system of man and of animals after death under chloroform.

These several subjects had involved an amount of detailed work that caused the committee to state that its work could be considerably forwarded if an assistant devoting his whole time to the matter could be engaged. The committee, after consideration of several forms of apparatus designed for the graduated administration of chloroform, and after adequate experience of the use of the chloroform balance for the anaesthesia of animals, believed that this apparatus could be usefully employed in the hospital. They had taken preliminary steps towards bringing the apparatus into a form suitable for this purpose, and they hoped that it would shortly be set in operation at St. George's Hospital, under the supervision of Dr. Hewitt. The principle of this apparatus and its application in the laboratory were described by Dr. Waller in an appendix to the interim report of the committee of last year. The apparatus fulfilled what had been recognized by the committee as the most important indication necessary for safe anaesthesia—namely, the uniform, continuous, and regulated administration of chloroform vapour between the limit of 1 and 2 per cent. The committee found that the

most convenient and reliable method of ascertaining the percentage of chloroform in air consisted in directly ascertaining on a balance the difference of weight between two identical counterpoised bulbs, A filled with air, B filled with the mixture to be titrated. As regards the production of anaesthesia by ether vapour, the committee was of opinion that the clinical experience obtained with an unknown percentage of ether vapour required to be complemented by the scientific knowledge of the percentages of ether and air that might be necessary and sufficient. It had initiated experiments upon animals, from which the provisional conclusion was drawn that a mixture composed of approximately 1 volume of ether vapour and 9 volumes of air should be safe and sufficient for the production of surgical anaesthesia. Comparative experiments had been undertaken for the committee by Drs. Veley and Waller during the past year on local anaesthetics. The first results had been published in the *Proceedings of the Royal Society* on the comparative action of stovaine and cocaine as measured by their direct effect upon the contractility of isolated muscle. Further observations had been made by Dr. Veley and Mr. Symes on the effects of stovaine and cocaine, the result of which would, it was hoped, shortly be published. Dr. Buckmaster and Mr. Gardner had pursued their investigation on "The Rate of Assumption of Chloroform by the Blood," and, arising out of that investigation, had undertaken an elaborate examination into the blood gases, the results of which would be published in due course. Drs. Hewitt and Waller brought forward definite experimental evidence that the effect of chloroform was aggravated by sub-oxygenation, and attenuated by hyper-oxygenation. The committee had co-opted Dr. V. H. Veley as a member, and asked to be reappointed. The work contemplated for the ensuing year comprised:

1. *On the clinical side:* The practical application to hospital purposes of the chloroform balance.

2. *On the scientific side:* The further study of the distribution of chloroform in the blood and tissues during life and after death, and of the comparative power of various local anaesthetics.

In conclusion, the committee thought fit to call attention to the fact that the importance of the questions involved was such that during the past year resolutions had been adopted by the General Medical Council and by the Council of the British Medical Association in support of early legislation to secure better regulation of the administration of general anaesthetics, and that the recent report of a Departmental Committee of the Home Office laid special stress upon the need of careful clinical observation controlled by physiological experiments.

Dr. HEWITT said that the Association might still further protect public interests by supporting the proposals for legislation recently made by the Home Office Departmental Committee and by the General Medical Council. As the law stood at present, any person whatsoever might give an anesthetic—general or local—and in order that the public, and particularly the poorer classes, might benefit, as they should, from the great discovery of anaesthesia, it was necessary that this state of things should be prohibited by law. The reform recently effected by which all medical and dental students were obliged to have received instruction in anaesthetics was a fitting preliminary to legislation, and the scientific work of the Anaesthetics Committee and of other committees would be most valuable in indicating the lines upon which students should be taught. He hoped that before long it would not only be illegal for ignorant and unqualified persons to give anaesthetics, but that, by reason of advances in our knowledge, these agents would invariably be administered on scientific principles. In this way he was confident that a marked diminution would be found in the mortality from anaesthetics. When it was remembered that anaesthetics were amongst the most powerful drugs now in use, it was surely necessary to protect the public against their indiscriminate employment. Unless anaesthetics were given by properly trained persons the public would continue to suffer on the one hand from unnecessary risk to life, and on the other from imperfect or make-believe anaesthesia. The Home Secretary had recently promised to consider the subject, and the present was a fitting opportunity to urge further legislation.

Professor W. H. THOMPSON (Dublin) urged the importance of doing something to check the mortality consequent upon the administration of anaesthetics, especially chloroform. He felt convinced that in the end they would revert, under proper conditions of administration, to chloroform.

Dr. CHARLES S. MINOT (Harvard Medical School, Boston, U.S.A.), in which city ether was first used as an anaesthetic, stated that ether was only used directly and exclusively there for relatively unimportant operations, in which but a small dose was required. The subject had been pursued so thoroughly in Boston that certain physicians made a speciality of anaesthetics, which had resulted in a great improvement in their use.

Compressed Air Illness.

A discussion on caisson disease was opened by Dr. LEONARD HILL. He said air dissolved in the body, according to Henry's law. The cause of the illness was the escape of nitrogen bubbles in the blood. Oxygen chemically combined with the tissues, and did not contribute to the illness. The prevention was the arrangement of the decompression period, so that the nitrogen dissolved in the body could escape through the lungs without the formation of bubbles in the blood. The blood was the carrier by which the tissues were saturated and desaturated on passing through the lungs. The Admiralty tables of stage decompression were based on this assumption. Experiments by Messrs. F. J. Twart, H. B. Walker, and the speaker showed that this was incorrect. The subject stayed an hour at + 45 lb. Free diuresis was established by drinking water. The bladder was emptied every seven minutes, after decompression in five minutes from + 45 lb. to + 15 lb. Analyses of the urine showed equilibrium of the nitrogen after about fourteen minutes. It followed that the arterial blood was only desaturated in about that time. The Admiralty tables and those of Mr. Japp (East River Tunnels, New York) were based on the suggestion that the blood circulated about once a minute, on the relative mass of blood and tissues, on the relative solubility of nitrogen in blood and tissues, and on the supposition that "quick" parts half saturated in about five minutes and "slow" parts in seventy-five minutes. The great difference between the circulation and pulmonary ventilation in states of rest and hard work had not been taken into account. The circulation might be six and even ten times faster during work. This upset all calculations based on "quick" and "slow" parts. Saturation and desaturation were not at the same rate, if carried out in the one case resting and in the other working. The decompression period could be shortened by making men work during it. The speaker and F. J. Twart had worked out the solubility of nitrogen in fact at + 90 lb., and found Vernon's figures for 1 atmosphere almost hold good for 7 atmospheres. Fat dissolved more than five times as much oxygen and nitrogen as water. These experiments confirming those of Greenwood and the speaker on heavy and light rats, and those of Boycott and Damant on fatter and leaner guinea-pigs, showed that fat men were unsuitable for compressed-air work. It had been established by human experience that short exposures to high pressures were free from risk. The Admiralty Committee therefore laid great stress on the danger of saturation of "slow" parts, and said the danger increased with the length of shift. While the effect of work might turn a "slow" into a "quick" part, the effect of fatigue in long shifts complicated the problem. Dr. Hill regarded the time required for saturation and desaturation of the blood and abdominal organs, such as the liver, as particularly the danger time. Neither the tables of the goat experiments of Boycott, Damant, and Haldane, nor the tables of Keays concerning the 557,000 man-shifts at the East River Tunnels gave conclusive evidence that shifts of three hours were more dangerous than one and a half, or eight than three. The variations in percentage of cases, even when calculated from groups of 3,000 to 4,000 man-shifts, were very large—for example, eight-hours' shift 0.43 per cent., May, 1907, and 0.94 per cent., January, 1907. Chance played a very big rôle. The first three-hour shift gave 0.35 per cent. cases, and 9 fatal or dangerous, in about 43,600 man-shifts; the second three-hour shift (after three hours' interval) gave 0.72 per cent. cases, and 4 dangerous or fatal, in the same number of man-shifts. The sum of cases for the six hours was 1.07 per cent. The percentage

in 10,700 man-shifts of eight hours was 0.62. Two three-hour shifts with a three-hour interval appeared, then, to be almost doubly as risky as one eight-hour shift, because it doubled the decompressions. The percentage of illness was 0.66 and death 0.0035, in 557,000 man-shifts, with a decompression-rate of fifteen minutes from +29 to +33 lb. Of the 3,692 cases among 10,000 men, 89 per cent. were bends, 5 per cent. vertigo = about 95 per cent. non-dangerous; 1.26 pain and prostration, 2.18 per cent. paralysis, 1.62 dyspnoea, 0.46 collapse = about 5 per cent. dangerous. The compression relieved 90 per cent., and of the rest all except 0 5 per cent. were partly relieved. The Admiralty table ordained a rate of 42 to 52 minutes stage decompression for +29 to 33 lb. Dr. Hill did not expect engineers to accept the Admiralty period in the face of the above figures. Eight thousand five hundred man-shifts were decompressed +40 lb. in 48 minutes, with 1.62 per cent. cases and no serious ones. The method was (1) +40 to +29 lb. in 5 minutes; (2) 10 minutes' walking in +29 lb.; (3) +29 to +12.5 lb. in 8 minutes; (4) 10 minutes' walking in +12.5 lb.; (5) +12 5 to +0 in 15 minutes. The Admiralty table ordained 92 minutes for this pressure. About half this time evidently was enough. "Slow" parts produced bends which did not matter; they could be relieved by recompression. Statistics of the results of "uniform stage" decompression obtained on goats by Boycott, Damant, and Haldane; on guinea-pigs by Boycott and Damant; on rabbits, pigs, and goats by Drs. Hill and Greenwood, taken together, afforded no convincing evidence of the superiority of either method. The pig was a better animal to compare with man than a goat. The fermentation of gas in the goat's stomach complicated the problem. Comparable pig figures showed 4 severe or fatal cases in 20 uniform, 9 in 32 stage, 9 in 44 modified uniform (decompression rate slowing as pressure fell). The time of decompression was 90 to 110 minutes, the pressure +75 lb. Decompression in 37 to 45 minutes killed 4 out of 4 by stage; 4 out of 8 and 3 severe cases by uniform. These were small pigs, weighing 33½ lb. to 49 lb. F. J. Twart and Dr. Hill had determined the desaturation of water when decompressed from +90 to +20 lb. in 10 minutes; and either (1) left quiet, (2) shaken, (3) gently oscillated, the gas came off without bubbling in 1 and 3. In the case of oil there was a slow, steady, formation of small bubbles (0.1 to 0.3 mm. in diameter). The unstudied conditions which controlled bubble formation in supersaturated solutions were of the first importance. "Delayed" illness and varying susceptibility depended on these influences. The varying percentage of fat in blood, chyle, liver, and the gaseous contents of the guts were factors. Ill health, a debauch, rich feeding modified these conditions. (Fat 3 to 11 per cent. in chyle, liver 2 to 3 5 per cent. in richly fed, 19 to 24 per cent. in fatty infiltration.) Experiments by M. Greenwood and Dr. Hill showed that it was fairly safe to decompress pigs and goats from +75 to +18 lb. in 10 minutes, and from +18 to +0 in 20 minutes, after an interval of 80 to 100 minutes. One death and no severe case resulted in 47 pigs weighing 50 to 100 lb.; 1 severe, 83 slight cases in 19 goats weighing 39 to 57 lb. To these might be added 4 pigs (56 to 100 lb.) safely decompressed from +60 lb. Decompression from +90 to +20 lb., followed by an interval of 105 to 120 minutes, gave unfavourable results in fat pigs weighing 81 to 115 lb.—namely, 7 deaths and 1 severe case in 27 pigs. The deaths occurred in the pigs which had the shortest interval, 105 to 110 minutes. Two of these deaths and the severe case were due to the pump stopping at +20 and the chamber rapidly leaking out. Only one pig out of all showed symptoms at +20 lb. The pigs lay asleep and did not move. Six goats compressed after a big feed were all taken with great gaseous distension of the stomach at +20 lb. By extending the interval to 140 to 150 minutes three goats (on a spare died) were decompressed successfully time after time after exposure to +90 lb. for three to four hours. An interval of 30 to 50 minutes at +15 lb. proved safe for twelve goats and one pig (96 lb.), after compression to +50 lb. Experiments by H. B. Walker, F. J. Twart, and Dr. Hill showed that the breathing of oxygen for a few minutes at +15 lb. washed the excess of nitrogen out of the urine (and blood) quickly, while only a little oxygen passed into the urine. It was safe to breathe oxygen for some minutes at +15 lb., but inadvisable to breathe it at higher pressures because of the toxic effects of high pressures of oxygen. Experiments of Major Greenwood and Dr. Hill showed that a partial pressure of CO_2 up to 1 to 2 per cent. was of no importance. Hot, moist atmospheres were exhausting. Many of the pig experiments were conducted with 4 to 5 per cent. atm. CO_2 in the chamber, and this was unfavourable, as the partial pressure fell on decompression, and lessened the pulmonary ventilation. Ventilation should be reduced in the lock. The cooling effect of decompression should be prevented, for it constricted the cutaneous vessels. M. Greenwood and Dr. Hill were safely decompressed from +75 lb. by the uniform method—about 20 minutes per atm., four experiments. They were actually exposed for about 30 minutes above +60 lb., and virtually exposed for about 50 minutes. From +60 lb. they were safely decompressed, six experiments. M. Greenwood was once decompressed safely from +92 lb. in 2 hours 17 minutes, after actual exposure above +75 lb. for about 30 minutes, and virtual exposure for about 55 minutes. Hersent safely decompressed men after exposures of 1 hour in 26 minutes from +2¼ atm.; in 46 minutes from +3 atm.; in 60 minutes from +3½ atm.; in 77 minutes from +4 atm.; in 100 minutes from +4½ atm.; in 150 minutes from +5 atm.; in 183 minutes from +5½ atm. Hersent safely used a method which was theoretically the worst—namely, +5 to +4 atm. in 45 minutes; +4 to +3 in 35; +3 to +2 in 30; +2 to +1 in 20; +1 to +0 in 15.

Damant and Cotte were safely decompressed several times after short exposures by the stage method of the Admiralty Committee—for example, in 51 minutes, after 12 minutes, at +80 lb.; in 90 minutes, after 29 minutes, at +80 lb.; in 50 minutes, after 6 minutes, at +93½ lb. These few high-pressure observations on men showed that the stage method could be used safely after short exposures. The experience of divers had proved that a short uniform decompression in 20 minutes or less could be safely borne after exposure of not more than 15 to 20 minutes to +60 to +73 lb.—for example, Erostabe, Lambert. Much depended on the individual. They did not prove the far greater risk of the uniform method as claimed by the Admiralty Committee.

Dr. Hill expressed his conclusions as follows: One stage at +15 lb. would suffice for caisson workers up to +50 lb. Exercise and oxygen could be used to shorten the pause at +15 lb. A pause of 15 minutes at +10 lb. for +30 lb., and of 30 minutes at +15 lb. for +45 lb. would probably suffice, so long as a medical lock for recompression was at hand.

The Effect of Climate on Health and Disease.

The committee on this subject, consisting of Sir Lauder Brunton (Chairman), Mr. J. Barcroft and Lieutenant-Colonel R. J. Simpson (Secretaries), Colonel Sir D. Bruce, Dr. S. G. Campbell, Sir Kendal Franks, Professor J. G. McKendrick, Sir A. Mitchell, Dr. C. F. K. Murray, Dr. C. Porter, Dr. J. L. Todd, Professor G. Sims Woodhead, and the Heads of the Schools of Tropical Medicine of Liverpool, London, and Edinburgh, presented its fourth report. The work produced by the committee had consisted in a series of observations carried out in the Island of Teneriffe on the subjects of the effect of altitude and solar radiation upon the organism. The committee was only prepared to report upon the first of these subjects this year. The work was carried on at three stations, the altitudes of which were—sea-level, 7,000 ft., and 11,000 ft. respectively. The dissociation curves of four members of the party were studied, two completely. D.'s curves were investigated at a constant CO_2 tension equal to that of his alveolar air at the sea-level (41 mm. of mercury). At different altitudes it was found that the affinity of the blood for oxygen decreased progressively as the altitude increased. In point of fact D's CO_2 tension became progressively lower as the altitude increased, and therefore another series of curves was delineated in which the CO_2 tension was that of the alveolar air at the altitude in question. These curves coincided with one another and with the sea-level curve (D.). The probable explanation of these facts was that as the altitude increased the carbonic acid was replaced in the blood by some most volatile acid, such as lactic acid, and that the total effective concentration of acid was the same throughout. The case of B. was somewhat different. His dissociation curve remained the same throughout, as also did the carbonic acid in his alveolar air. Hence in his case also the total concentration of acid

in the blood remained unaltered. The further question arose: Is it possible to explain the difference between the two types of reaction? In the first place, B.'s curve at the sea-level was somewhat different from that of D. The difference indicated a greater alkalinity in B.'s blood. Titration bore out this indication. In the second place, considerations based upon his respiratory quotient required that in proportion as the CO_2 tension in D.'s alveolar air was lower at 11,000 ft. than in that of B., so D.'s oxygen tension was higher than that of B. Actual analysis showed this to be true. At 11,000 ft. D. had an oxygen tension of 63 mm. and B. of 49 mm. In the third place, Krogh had shown that the oxygen tension in the blood could be calculated from that in the alveolar air by subtracting 1 mm. for every 100 c.cm. of oxygen absorbed by the lung per minute.

The following table will therefore give the oxygen tension in D.'s and B.'s blood under varying circumstances of oxygen intake:

O_2 absorbed per minute	c.cm. 300	c.cm. 600	c.cm. 900	c.cm. 1,200	c.cm. 1,500	c.cm. 1,800	c.cm. 2,100
O_2 tension in D.'s blood at 11,000 ft.	mm. 58	mm. 55	mm. 51	mm. 48	mm. 45	mm. 42	mm. 37
O_2 tension in B.'s blood at 11,000 ft.	46	43	39	36	33	30	26

The point of interest was that, at rest (that is, using about 300 c.cm. of O_2 per minute), B.'s blood and D.'s were about equally saturated. Hence, as B. was careful not to take much exercise, his blood had had no occasion to compensate, he was in as strong a position as D., who had compensated. On the other hand, were increasing quantities of exercise taken, and increasing quantities of oxygen absorbed, B. would be more and more at a disadvantage. These facts form at least an intelligible reason why B. should have suffered from mountain sickness when he attempted to take exercise at 11,000 ft., whilst D. did not.

Essentials of Voice Production.

Professor WESLEY MILLS presented a communication on this subject. He said that at the present time it was vital for those who taught especially to agree on some principles. Only principles and not "methods," except those based on a few fundamentals, were possible. It was better to abandon the term "method" if applied to any one's systematic teaching. It was more important to emphasize what was common in the teaching and practice of speaking and singing than the differences. Other things being equal, the more of a singer the speaker was the greater his success. For the singer, training in speaking should for a time precede training in singing or be carried on with it. The vocal mechanism consisted of three main parts. In using these the subject employed neuro-muscular mechanisms controlled by psychic factors. The psychic must precede the somatic. At first results were largely voluntary; later reflex and subconscious. In all muscular movements, those concerned with voice production included, sensations were of vital importance. In phonation the chief sense was hearing, but others, usually associated with muscular movements, were also essential. Without these "voice-placement" was impossible. Speaking of breathing in relation to voice production, Professor Wesley Mills said the practice of the old Italian vocal teachers was not inconsistent with the latest investigations on breathing. Good voice production did not necessarily constitute good art, but was essential to it. The term "accent" as now often used was unsatisfactory. The value or quality of vowel sounds should be settled by an international commission of experts. The same applied to a few consonants, especially "r."

Evolution of Speech and Speech Centres.

In a communication on this subject, Dr. ALBERT A. GRAY said speech developed as a result of hearing, hence it was not surprising that the centre in the brain for the understanding of speech was in close proximity to that for hearing, and, indeed, might for some purposes be considered as part of that centre. The centre for the understanding of speech, however, was limited to the left side, while that for hearing was found on both sides of the brain. The centre for hearing was termed the audito-sensory centre, and that for the understanding of speech audito-psychic. Hence when these centres were destroyed on both sides, the individual became quite deaf and did not understand speech. If the centres were destroyed on the left side only, he heard what was spoken because the right audito-sensory centre was still intact, but he did not understand what was said because the audito-psychic centre was present on the left side only, and was destroyed. If the hearing centre on the right side only was destroyed the individual could still hear and understand speech. The centre for the production of speech was found on the left side of the brain in the third frontal convolution and adjacent regions. Since this centre was only concerned in the production of speech, it followed that when it was destroyed the individual could still hear and understand what was said to him, but he could not frame words and sentences to express himself in speech. Dealing with the mechanism of the voice, Dr. Gray said the voice was produced by the vibrations of the vocal cords, and, for the most part, the various tones depended upon the portions of the cords which vibrated and the degree of tension in these portions. The changes in the extent and tension of the vibrating portions of the vocal cords were determined by muscular action, which in its turn was governed by the centres in the brain described previously. The voice was resonated in the cavities of the mouth, pharynx, and nose. Hence, by altering the size and shape of these cavities by means of movements of the tongue, palate, etc., the quality of the tones produced in the larynx could be affected at will.

Body Metabolism in Cancer.

The following report of the committee, consisting of Professor C. S. Sherrington (Chairman) and Dr. S. M. Copeman (Secretary), on body metabolism in cancer was presented:

Consideration of the curves of cancer mortality in the human subject, whether male or female, discloses the interesting and important fact that cancer is not, as is usually thought to be the case, a disease of old age, however much it may be related to senescence of certain of the body tissues. As a matter of fact, the disease is of extreme rarity in the later years of life, especially in the female sex. Thus the characteristic feature of the age-incidence of cancer, as pointed out by Roger Williams and others, and as demonstrated by the returns of the Registrar-General, is not its continued increase with advance of years, but rather its disproportionate augmentation in the post-meridian periods of life—that is, between the ages of 45 and 65 years—liability to the malady waxing as the reproductive activities wane. The facts, indeed, clearly show that cancer is *not* a disease of senility merely, which *per se* plays no part in its development. In the animal world the age-incidence of cancer is evidently governed by a similar law, as has been demonstrated by Stricker for horses and dogs, and by Bashford and Murray for mice; all these observers being in agreement as to the rarity of malignant tumours in early life and their relative frequency in later life, antecedent, however, to onset of old age. In the light of these facts, it would seem not improbable that the onset of malignant disease, whether in man or the lower animals, may have intimate relationship with diminished or perverted functioning of the reproductive organs, which, under normal circumstances, may be regarded as exerting—possibly by virtue of their so-called "internal secretions"—some restraining and co-ordinating influence on the growth of the somatic tissue elements. Evidence of the existence of such a controlling influence is found in the fact, on which there is now general agreement among those engaged in the experimental investigation of cancer, that whereas transplantation of "spontaneous" cancer in the mouse to normal individuals is apt to prove successful in but few instances when full-grown animals are employed for experimental purposes, complete insertion success has not infrequently proved possible of accomplishment when mice of not more than 6 or 7 weeks old are used. In view of the further fact that fanciers are agreed that the mouse is incapable of reproduction before the age of 3 months, while 6 months is generally stated to be the earliest age at which these animals should be mated in order to ensure healthy offspring, it would appear that the

greatest measure of success in experimental implantation of cancer in this animal is obtainable only during the period of life antecedent to full or even commencing activity of the reproductive functions. On the other hand, implantation of cancer material from one mouse to another is *least* likely to be attended by success when the recipient is of an age at which these functions have attained the stage of full activity.

For these and other reasons it appeared desirable to investigate the question as to whether any of the products of the reproductive glands—presumably given off, under normal circumstances, in the form of an internal secretion—can be shown experimentally to influence, in one or another direction, the development of cancer as witnessed when this disease is experimentally produced in the mouse. For the prosecution of this investigation facilities have been most kindly afforded by the Executive Committee and the Director (Dr. Bashford) of the Imperial Cancer Research Fund.

Although at the present time but little doubt exists as to the production of an internal secretion by the testes and ovaries, practically nothing is known of its nature and composition. It has, however, been suggested that its main constituent is in all probability derived from metabolism of nucleo proteids which are present to so considerable an extent in the tissues of the reproductive glands. Professor von Poehl, of St. Petersburg, and others have, indeed, claimed that spermin, a crystallizable substance which has been isolated from the testes, prostate, ovaries, and in less amount from certain other organs and tissues, constitutes the essential principle in question. For the purposes of the present investigation, therefore, it appeared desirable, in the first instance, to make use of this substance (of which Dr. von Poehl, the successor of the late Professor von Poehl, kindly provided supplies), employing, in addition, freshly prepared emulsions of mouse testes, extracts of dried and powdered testes freed from nucleoproteid, boiled watery extracts of the testicle of various animals, and a solution of nucleinic acid of orchitic origin. In every instance the action of all these various substances was tested on the mouse by hypodermic injection, while fresh emulsion of testes and solutions of nucleinic acid were also administered internally by a method of experimental feeding devised for the purpose.

For each series of experiments a number of mice were employed which had been inoculated with cancer material, by a member of the staff of the Imperial Cancer Research Laboratories, from ten days to three weeks previously, by which time most of the animals had developed tumours, sometimes of considerable size, at the site of operation. The precise area of the resulting tumours in each animal is recorded on charts by one of the laboratory attendants ten days after implantation, and subsequently at weekly intervals. In every experiment one lot of inoculated mice was set aside as a control. Each series of experiments has extended over a period of five or six weeks, or occasionally even more, so that the work has necessarily taken up a considerable period of time. Owing also to exigencies of the special work of the laboratory staff, and of official duties on the part of the member of this committee to whom the investigation was entrusted, delay in the prosecution of the work has from time to time proved unavoidable.

As the work is still in progress it would serve no useful purpose, on the present occasion, to enter into details of the numerous experiments performed. It is therefore proposed only here to set out a brief statement of the main results which thus far have been obtained.

As a preliminary step a number of mice were injected hypodermically with a 2 per cent. solution of spermin in normal saline solution, in quantities varying from 0.1 to 0.4 c.cm., in order to make certain that the employment of this substance was not productive of any ill effect on the mouse. This having proved to be the case with these doses, four mice which had been inoculated just previously with 0.05 gram of tumour $\frac{63}{41A}$ in the left axilla, were subsequently injected daily, with the exception of Sundays, for a period of seventeen days, with 0.4 c.cm. of the spermin solution. By this date three out of the four tumours which had arisen in these mice, as the result of inoculation, had entirely disappeared, while of eight tumours which had arisen in ten control mice, inoculated on the same date, *none* had disappeared, although two had somewhat decreased in size.

On February 4th of the present year twenty mice were inoculated with a very rapidly growing strain of tumour, of which ten were kept as controls in a separate cage. A week later tumours had appeared in all these mice. From this date, for a period of nearly three weeks, ten of the mice were injected daily, except on Saturdays and Sundays, with 0.4 c.cm. of the spermin solution. As by this time the result obtained with the injected as compared with the control mice merely showed differences which might be considered as coming within the limit of experimental variation, the work was not continued.

In view of the apparent difference of results obtained in these two experiments, Dr. Bashford suggested that for future work it would be desirable to employ for purposes of inoculation a slow but continuously growing tumour (Twort 30B.), which, in this respect, most nearly reproduces the characteristics of a spontaneously occurring tumour. With this material Dr. Murray inoculated forty mice on March 4th, of which ten were kept as controls, the other thirty being divided into three lots of ten each, and kept in separate cages. These were respectively injected daily: (*a*) With fresh emulsion of mouse testis 0.4 c.cm. each; (*b*) with spermin solution; and (*c*) Poehl's orchidin solution in similar quantities. On March 21st eight tumours had developed in each lot of ten mice, while one of the controls had died. By April 4th, of the spermin series, five of the tumours had disappeared; of the testicle emulsion series, all eight tumours showed a definite increase in size, while of the orchidin series the tumours exhibited no appreciable difference from those of the controls. At this point the experiment was unavoidably interrupted.

In a further experiment on somewhat different lines half the number of the experimental mice, in addition to being injected daily with spermin, had fresh testicle emulsion administered by the mouth. These latter, at the end of four days, showed a considerable diminution in size as compared with those injected with spermin only, one tumour of fair size having even at so early a stage of the experiment disappeared completely. Subsequently, however—possibly for the reason that the dose of spermin, which was larger than in previous experiments, was repeated too frequently—all the remaining tumours exhibited slow but steady increase in size up to the period when, three weeks later, the experiment was terminated.

In other experiments a testicle extract was employed which had been freed from nucleo-proteid, and which therefore contained, in addition to spermin, creatin and other extractives, as well as inorganic salts. The use of this material for the purposes of injection in a large number of mice eventually afforded no appreciable difference from the control of mice as regards the size of the tumours, the result thus differing, on the one hand, from the definite increase obtained with the use of *fresh* testicle emulsion, and, on the other, from the diminution obtained in certain instances in which a solution of spermin was employed. Certain of these experiments are now in process of being repeated, with large numbers of mice, by independent workers in the laboratories of the Imperial Cancer Research Fund, where also, thanks to the kindness of Dr. Bashford, a further series of experiments are also being carried out, in which nucleinic acid of orchitic origin is to be employed, both hypodermically and by oral administration—in the latter case both with and without the simultaneous use of hypodermic injections of spermin.

Anthropometry of Oxford Undergraduates.

Dr. EDGAR SCHUSTER presented a communication embodying the first results from the Oxford Anthropometric Laboratory. The laboratory was started by Professor Bourne in January, 1908, with the following objects, among others:

(1) To obtain a statistical survey of the physical development of undergraduates. (2) To ascertain what bodily changes or developments take place during a man's residence at Oxford as an undergraduate, and whether such changes depend at all on what games he plays, what school he reads for, and so on.

The following measurements and tests were applied: (1) *Acuity of vision;* (2) *spot pattern test.* This test was devised by Dr. McDougall, and was intended to measure the power of concentration. A pattern made by pricking nine holes in a piece of cardboard was shown to the sub-

ject for a small fraction of a second by means of an electric light placed behind it and a photographic shutter. After seeing the pattern five times in this way, he was asked to make a map of it on squared paper. This he probably failed to do correctly; he was then shown the pattern five times again, and was asked to make a fresh map; and so on until he got it right. Some interesting results had been obtained with this test, for it had been found that the scholars and exhibitioners were distinctly better at it than commoners; secondly, that men who subsequently took first and second classes in the final schools were better than those who took lower classes; and, thirdly, that men reading science and mathematics were, on the whole, better than those reading other subjects. (3) *Lung capacity*, measured with a spirometer. (4) *Stature, standing, sitting, and kneeling*, from which were deduced length of leg and length of thigh. (5) *Weight.* (6) *Strength of pull;* and also the following *head measurements:* length, breadth, auricular height, horizontal circumference, sagittal arc, transverse arc. In treating the material the men were divided into groups according to age, and each age group was considered separately. The averages, standard deviations, and various correlation coefficients had been found for each group. The strength of pull and lung capacity increased considerably with age. Stature, weight, and head length also showed a similar tendency, but not to so marked an extent.

Mental and Muscular Fatigue.

The committee, consisting of Professor C. S. Sherrington (Chairman), Mr. W. MacDougall (Secretary), Professor J. S. MacDonald, and Mr. H. Sackville Lawson, appointed to investigate this subject, presented an interim report. It was stated that Professor J. S. MacDonald of Sheffield had been engaged especially on the physiological aspects of muscular fatigue as studied in isolated muscle preparations. Mr. H. S. Lawson of Wolverhampton had worked on the examination of fatigue in schools, and had had a number of school teachers engaged in the observations. It was urgently desirable that the committee should be reappointed for another year in order to carry on their investigations further.

Muscular Fatigue.

Professor MACDONALD, in his report, said that repeated excitation of excised frog's muscle led finally to a complete stage of exhaustion, during which a maintained state of slight contracture was present unbroken by any new contractile responses to continued stimulation. Before reaching this stage, the muscle yielded contractions, steadily diminishing in height and increasing in duration. These two modifications did not follow the same law of development. It was possible thus to secure a maximal degree of the one associated with a minimal degree of the other. Thus, also, the change in height of the contractions was arithmetically progressive, whereas the change in duration, increasing at first slowly, later proceeded at greatly increased pace. The later stages of this rapid development might be masked when the muscle was made to lift a maximal load, and such conditions might give rise to the still more complex appearance of a contraction line, increasing at first and later diminishing. In addition a further and separable effect of previous activity was that initial increase in the height of contraction spoken of as Bowditch's "staircase." It was a common opinion that this phenomenon was to be observed in muscle in a fresh state. Professor MacDonald had made certain of the fact that it was capable of demonstration, not near the final stage of fatigue, but at a surprisingly late stage of fatigue. Thus it was possible, by the interpolation of a short period of rest and a subsequent renewal of stimulation, after fatiguing a muscle until it yielded a contracture upon which each new response appeared merely as an augmentation of this state, to observe this staircase phenomenon in a series of contractions, each of which was obviously of a very prolonged and therefore fatigued type. Viewing the prolongation as symptomatic of a severe degree of fatigue, it was inconceivable that muscle in this state should contract to a greater degree save as the result of an increased excitation. It became necessary, therefore, to consider the possibility that the nervous impulse conveyed to the contractile material was modified by material within the muscle, and that conduction through this material was quantitatively facilitated by immediately antecedent use. The staircase phenomenon was quite possibly an affair involving the sarcoplasm, and not the contractile sarcostyles of muscle. In what degree a similar statement was applicable, not only to the initial increase, but also to the later fall in the height of contraction, remained an open question.

In order to simplify the investigation of such points, he had directed attention to the necessity for a connected conception of the facts of muscular contraction, and in a paper published in the *Quarterly Journal of Physiology* he had endeavoured to supply a conception everywhere consonant with observed fact. According to the views there advanced the relaxation of muscle was an active process reversing the conditions effective during contraction, and was to be regarded as a process of recuperation tending to reconstitute in the muscle a state favourable to the development of a subsequent contraction. The increased duration of the contraction of a fatigued muscle, mainly, but by no means entirely, occupying the period of relaxation, was capable of treatment as due to a diminished recuperative power. It was of interest therefore to place alongside of this statement the fact, observed by all those engaged in the collection of measurements of heat production in excised muscle, that when fresh and fatigued muscles were made by adjustment of the stimulation to perform equal work, fatigued muscle gave off less heat.

It was fair to assume that less combustion (that is, oxidation) had occurred because the store of combustible material was becoming exhausted. As a matter of fact, it had been shown that the presence of a smaller amount of such material did actually, without reference to rest or fatigue, diminish the amount of heat evolved during any standard contraction. Temporarily, therefore, it might be said that a fatigued muscle performed similar work, accompanied by diminished oxidation. It was absurd, then, to regard oxidation as the prime cause of contraction. It was, on the other hand, more probably a consequence of contraction, not so much in the forefront during fatigue. In the paper referred to he had endeavoured to show that this was the case, and that oxidation, like relaxation, was a recuperative process, which placed a muscle that had once contracted in a position to contract again.

1. Previous activity was then liable to modify the contraction process, as in the case of the staircase, by modifying the transmission of excitation through a muscle—that was to say, by modifying the mode of transmission of electrical charges. Since this transmission depended upon the electrolytes of muscle, one might look for modifications in these electrolytes as due to previous activity, and possibly responsible for many of the best known incidents in fatigue.

2. Previous activity also affected the store of combustible material within muscle, and so greatly modified its recuperative power.

As to the manner of the recuperation, which was partially defeated by fatigue, it was possible that there were differences in such different cases as those provided by the muscle of cold-blooded and warm-blooded animals respectively. When the recuperative processes of the relaxation period had done their work there was still need for further recuperation. This was clearly seen in the case of frog's muscle. Thus, he had made sure of the fact that even the second contraction of such a muscle was modified by the occurrence of the first to a demonstrable degree, provided that it was observed within a certain period, much more prolonged than that of visible change, after the occurrence of the first. The second contraction was not only higher (staircase), but even more clearly prolonged. Oxidations, accelerated by contraction—and these were the whole source of energy—were occurring in this later period of relaxation, but were here more clearly seen as alone in action. In what form did such processes provide their energy? Conceivably, this energy might be placed at the disposal of the muscle in the simplest way, as so much heat, or as some other form of energy. In this connexion he had continued an investigation of the relation between temperature and the internal osmotic pressure of muscle, since contraction was probably due to variations in the distribution of this factor within the muscle, but so far without observing any corresponding change not similarly producible in any simple solution having none of the attributes of "muscle."

This investigation had, however, still to be continued into the case of mammalian muscle. It was clear that it would militate greatly against the average efficiency of the muscles of cold-blooded animals if their energy was delivered to them in the form of heat, and the only conditions determining an addition or an abstraction of energy were variations in external temperature. The muscle of the warm-blooded animal was more fortunately situated behind the protection of its constant temperature regulation. The usual expectation was that muscle of this second class was more complex in its relation to its oxidative sources of energy. It was probable that the fact was the reverse of this, and that the warm-blooded muscle was more simple, and did actually owe the physical condition of its internal solutions, upon which the phenomenon of contraction depended, to the heat provided by the processes of oxidation. That was to say, it was conceivable that the maintenance of a constant temperature was also to be regarded as the maintenance of a constant bank of energy.

Mental Fatigue in Schools.

In a communication on this subject Mr. H. SACKVILLE LAWSON said the investigation was begun in November, 1908. The general object had been to discover what relation existed between the proved ability (relative) of a subject and his capacity for continuous work at high pressure—namely, to discover whether an able boy was more resistant to fatigue than one less gifted. The local committee engaged on the investigation consisted of three head masters of elementary schools and Mr. Sackville Lawson himself. The number of boys experimented on was thirty, ten from each of the three schools. Each boy was within two months of 9 years on January 1st, 1909. The nature of the experimental work had been twofold. It had been the aim of the committee:

1. To obtain, by means of suitable tests submitted, a "General Intelligence" Order of Merit for the thirty boys.
2. To provide continuous work of such a nature and for such a period of time that fatigue effects may be shown.

PART I.—*General Intelligence Order of Merit.*

Twelve tests had been given. The length of time for a single test had been from five to ten days. The final Order of Merit had been obtained by aggregating the places obtained in the various intelligence tests. This final order was considered to be a hierarchy of Natural Intelligence. Incidentally it might be mentioned that a separate order of merit had been obtained by the ordinary scholastic examination methods. This had been found to correlate with the other to the extent of 0.61 where 1 = complete similarity of rank or identity of position.

PART II.—*Fatigue Tests.*

The general method of procedure had been as follows:

Written work, generally of a mathematical nature, had been given for a period of half an hour per day. This half hour had been taken either at the beginning or at the end of the school day. On the expiration of each five minutes a signal had been given in order that the output per period might be calculated. Thus there had been six consecutive periods each of five minutes' duration. The output in sums completed per period, as well as the number accurately done, had been calculated. Increase in rapidity and improvement in accuracy had been assumed to be due to the favourable influence of practice, while the reverse result had been ascribed to the inhibiting effects of fatigue.

Since "practice" and "fatigue" were forces opposed to one another, in that they reacted on the individual in contrary manner, it followed that the effect produced must be a resultant one. Where the urging forward tendency was strong the pushing back might be present latently. A 20 per cent. increase due to practice would hide a 10 per cent. diminution due to fatigue.

The figures given below represented the resultant generic effect produced by Fatigue Test A.

Period.	Length.	Number of Days.	A. Output (Gross).	B. Output (Accuracies).	C. Per cent. of Sums done Correctly.
I	5 minutes	5	880	532	60.5
II	,,	5	798	448	56 0
III	,,	5	854	455	53.3
IV	,,	5	804	438	54 8
V	,,	5	790	406	51.0
VI	,,	5	795	379	47.5

The figures in columns A and B represented the sum total of the efforts of twenty-five boys. Column C showed the accuracy output per hundred sums per period.

In the instance considered the worst period was the last, the best period the first. The coefficient of diminished accuracy was found by subtracting the minimum value (47.5) after the maximum (60.5) had been obtained, and dividing this number by the maximum value. Thus

$$60.5 - 47.5 = 13; \text{ and } \frac{13}{60.5} = .2148, \text{ or } 21.48 \text{ per cent.,}$$

where the number 100 represented absolute inaccuracy and 240 a condition of complete sustained accuracy. It was assumed provisionally that the falling-off in accuracy was due to fatigue. In this manner the individual performances had been calculated and an order of merit had been obtained. The top boy in the order was he who showed the least susceptibility to fatigue, who maintained, that is, the steadiest output of accurate work period by period throughout the time allotted to the test.

The crude coefficient of correlation between this order and the final order of intelligence was 0.22, or as a percentage 22 where the number 100 represented similarity of rank or identity of position. When the order of merit (fatigue) was inverted, and the top place assumed by that boy who showed the greatest susceptibility to fatigue, as measured in terms of diminished accuracy of output, the coefficient of correlation was — .28.

With regard to the other fatigue tests, the clerical work was not yet finished. They may, however, briefly be summarized as follows:

Test A.—Addition sums. Two digit numbers. Five numbers in column. Thirty minutes a day for three days. Given at conclusion of school working day.

Test B.—Counting squares. Size $\frac{1}{8}$ sq. in. Thirty minutes a day for five days. Given at commencement of school working day.

Method.—Pencil dot is made in each square. Across every tenth square a diagonal is drawn. Unit effort is ten squares. Number of units marked noted per period.

Test C.—Multiplication sums. Five digit numbers multiplied by two digit numbers. Thirty minutes a day for two days. Given at conclusion of school working day. In each of these tests a signal was given at the end of each five-minute period in order that the output per period might be calculated.

Test D.—Dotting test. The machine which is being used is Dr. Rivers's modification of Dr. Dougall's apparatus.

The committee hoped to produce its report in December.

SECTION OF EDUCATION.

Tests of Intelligence.

In the Section of Education, Dr. OTTO LIPMANN presented a paper on methods of testing intelligence in children. He said Binet and Simon gave a number of tests by which all the mental functions belonging to the intelligence might be investigated. They showed for each age the tests which a "normal" child might be expected to accomplish. The preliminary question, What percentage of children of the same age were normal? was answered by nearly the same number, whether the method of Galton, McDougall, or that followed in several other investigations was employed. If the supernormal individuals who accomplished the test were added, the result was nearly always the same—a percentage of 77.

In a paper on experimental tests of general intelligence, Mr. CYRIL BURT stated that a series of experiments was carried out at Oxford two years ago, mainly upon thirty elementary school children, 12½ to 13½ years of age. The chief object was to determine the relative value, as tests of general intelligence, of a dozen brief tasks, involving mental processes at various levels, in various aspects and of various degrees of complexity. By "general intelligence" was understood innate, unspecialized mental efficiency, as distinguished both from acquired knowledge, interests, and dexterities, and from specific endowment, aptitude, or talent. Views attributing to sensory discrimination, whether general or specific, an intimate functional correspondence with general intelligence, were not confirmed. Auditory and visual tests, indeed, showed positive, though not considerable, correlations with intelligence; but these seemed rather to be referred to the dependence in the course of evolution of the progress of intelligence upon the perception of space and upon the perception of spoken words, and of these respectively upon delicacy of eye and ear. Tests of discrimination of touches and of weights showed approximately no correlation with intelligence whatever. Simple motor tests, such as tapping and dealing, showed somewhat

higher correlations than the sensory tests. But of the six simpler tests, sensory and motor, none gave correlations above 0.05. The remaining six dealt either with processes of a higher mental level—such as memory, habituation, scope, and maintenance of attention—or with more complex mental processes, involving co-ordination of both sensory and motor activities. Each of these six yielded correlations of over 0.50, the coefficients in the case of the last two being particularly high. An amalgamation of the results of the six gave correlations with intelligence of 0.85 to 0.91; and these figures were distinctly higher than those for the estimates of one teacher with another's, or with the results of examinations. Further experiment had since been made in Liverpool at a mixed secondary school and at a secondary school for girls. The main object of these was to investigate three problems suggested by the limitations of the foregoing investigation—namely, how far such tests were affected by difference in sex, how far they could be undertaken with success by teachers untrained in a psychological laboratory, and how far they could be carried out as mass-experiments with numbers of children simultaneously instead of singly upon individuals. Tests had also been added to represent processes of the highest mental level—abstraction, judgement, inference, perception of relations—a level untouched by the previous research. The results indicated that, as compared with simple sensory or motor tests, tasks involving higher and more complex processes were vitiated to a far less extent by difference of sex in the subjects, absence of special training in the experimenter, and the peculiar conditions of experiments upon children in class. They also appeared to possess the most intimate relations to intelligence. Tests, therefore, of this type seemed the more practicable for educational investigations and sociological surveys upon a scale sufficiently extensive for statistical treatment of the results.

Perseveration.

In a paper on perseveration as a test of the quality of intelligence and apparatus for its measurement, Mr. J. G. GRAY said that perseveration depended on an elemental property of the brain which determined the persistence of mental impressions or the rapidity with which one impression could follow another. It might be measured in various ways, one of the best being by Wiersma's colour disc. On this disc were two colours which could be seen separately when the disc was rotating slowly, but as the speed of the disc was gradually increased a point was reached when the two colours fused into one uniform tint. This critical speed was a measure of the perseveration of the subject being tested. Gross had shown theoretically how the mental character of the subject might be deduced from his or her perseveration, and the experiments made by Wiersma and others agreed very closely with Gross's theoretical deductions. Perseveration indicated the quality of the intelligence rather than its amount; persons with high perseveration might be described as slow-intelligent, and those with low perseveration as quick-intelligent. There was a considerable range of perseveration among normal persons, but when it passed above or below certain limits it was usually associated with insanity of different kinds. Acute maniacs had abnormally low and melancholics abnormally high perseveration. A description was given of an improvement on Wiersma's disc devised by the author, in which illuminated coloured glasses were reflected into the eye of the subject by a revolving mirror. This enabled the luminosity of the colours to be regulated. Results of tests made by the author on visitors to the exhibitions at the White City were given, and an interesting hypothesis on the connexion between perseveration and colour blindness.

Intelligence in School Children.

Mr. WILLIAM BROWN dealt with the measurement of intelligence in school children. He said that, although from an abstract and formal point of view it might be expected that a definition of intelligence should precede any investigation into the problem of its measurement, such an arrangement was only partially justifiable. Unless they were prepared to hypostatize intelligence as merely one of a number of "faculties" displayed by the mind, they must face the problem of an all-inclusive survey of the mental ability of individuals; and, if they possessed the means of measuring the nature and degree of the interrelations existing between the various distinguishable factors of such mental ability, they might find themselves justified in regarding the mind as some sort of system to which in its entirety, at least from one point of view, the name intelligence might best be applied. If such a result should emerge the problems of the measurement and the definition of intelligence would be solved simultaneously. Since the mind, like the body, was variable, the method most applicable to the problem would be the statistical method of correlation. Taking a sufficient number of cases, they might proceed to determine the magnitude of the tendency to concomitant variation displayed by the various subsidiary mental capacities distinguished by ordinary thought and measured by ordinary standards.

Binet's Method.

M. Binet's method for the measurement of intelligence was described by Miss KATHARINE L. JOHNSTON, who had applied his tests to 200 school girls of Sheffield. She said if these tests were what their authors hoped them to be they would assist teachers who desired to determine the reasons for the lack of progress of pupils, or to gain knowledge of the intellectual calibre of a new pupil. Children of 9, for example, were asked, *inter alia* (1) to give the exact date; (2) to enumerate the days of the week; (3) to recall after a brief interval at least six facts mentioned in a brief newspaper extract. Should a child accomplish all or all but one of the tests he was adjudged at the level of that age, and was then subjected to all the tests of the succeeding ages. If he accomplished five of these a year was added to his level; if ten, two years. But if the child failed in two or more of the tests appropriate to his own age he was put through the tests of each preceding year in turn until he proved successful.

Dr. CHARLES M. MYERS, in a paper on the pitfalls of "mental tests," entered a protest against the collection of vast quantities of psychological data, especially by an army of untrained observers. Nothing could be more dangerous than the supposition that the consequent errors cancelled one another in the long run.

Professor O. MEUMANN, whose paper was read by Dr. LUCY HOESCH ERNST, said that general intelligence could never be determined by "intelligence tests," but higher intelligence could.

Dr. W. H. R. RIVERS, of Cambridge, said that a great advance had been made in the scientific testing of intelligence, but there was still an enormous discrepancy between different observers' results of a comparatively simple test. Extreme care was therefore desirable, and a vast amount of work would have to be done before there was any hope of applying test systems practically. All the results cited had been drawn from children in the mass, and simply suggested the kind of lines on which work should proceed in order to get at tests applicable to individuals. It would be extremely useful if doctors could have some definite tests of defective intelligence, instead of having to reach a decision in a rather haphazard way.

SECTION OF ANTHROPOLOGY.

The People of Egypt.

Professor G. ELLIOT SMITH presented a communication on the people of Egypt. In the present state of our knowledge, he said, it would be idle to discuss the origin of the predynastic Egyptian population beyond stating that the people showed undoubted affinities with the so-called "Mediterranean race," as well as with the Arabs, and that they must have been settled in the Nile valley for many ages before they constructed the earliest prehistoric graves known to us, for their peculiarly distinctive culture, their arts, their mode of writing, and their religion were certainly evolved in Egypt. But even before the end of the predynastic period a slight change in the physical traits of the population could be detected; although it was not until more than four centuries later—it was not until the time of the Third Dynasty—that the modification of the physical type became sufficiently pronounced to afford unmistakable evidence of its significance. Then the three Nile territories under consideration had each its own distinctive people: Lower Nubia, a population essentially identical with the predynastic Egyptian, but slightly tinctured with

negro; Lower Egypt, the descendants of the predynastic Egyptians, profoundly modified by admixture with alien white immigrants, who entered the Nile valley via the Delta; and Upper Egypt, protected by its geographical position from the direct effect of either of these foreign influences, was being subjected to the indirect influence of both by the intermingling of its people with those of Nubia and Northern Egypt. In the time of the Middle Kingdom this double racial influence became much more pronounced in the Thebaid. The Nubian element also became more significant, the influx consisting at various times of slaves, mercenaries, and perhaps also invaders, not to mention the slow but steady percolation into Egypt of a negroid element resulting from the secular intermingling of neighbouring peoples. Thus began that graduation of racial characters in the Nile valley, ranging from the Levantine white population of Alexandria to the negro of the Soudan, which had persisted until the present day, and was displayed even in the measurements of 30,000 modern Egyptian men, which were now being examined by Mr. J. I. Craig. It was not yet possible to express a positive opinion as to the source of the white immigration into the Delta, which first reached significant proportions in the times of the Third and Fourth Dynasties; but, from evidence which he had recently collected, it seemed probable that the bulk of it came from the Levant. It was most likely, however, that there was a steady influx into the Delta of people coming both from east and west, and that their percolation into Egypt was so gradual as not violently to disturb the even flow of the evolution of the distinctive Egyptian civilization. Nevertheless, it was perhaps not without significance, especially when they took into account the simple-minded, unprogressive, and extremely conservative character of the real Egyptian, to note that none of the greatest monuments were constructed nor the most noteworthy advances made in the arts of the Egyptian civilization, except on the initiative of the aristocracy, in the composition of which there was a considerable infusion of non-Egyptian blood. From the times of the Pyramid builders until the present day Egypt's rulers had probably never been of undiluted Egyptian origin.

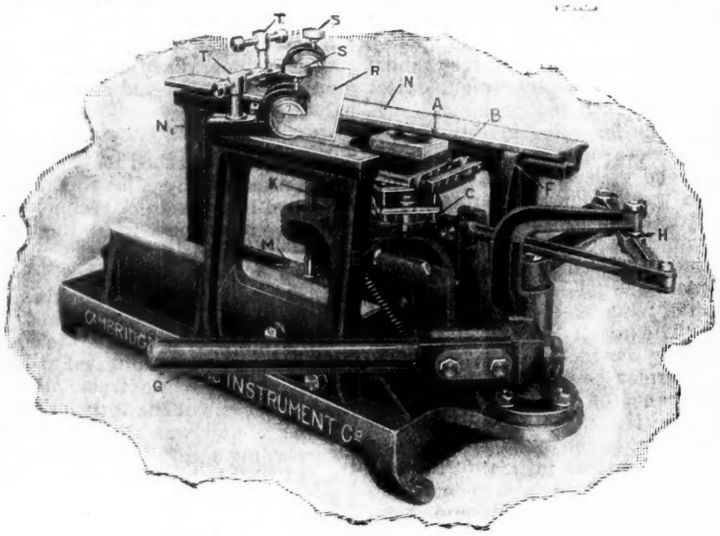

Fig. 1.—General view of large sliding microtome.

Excavations at Memphis.

Professor W. M. FLINDERS PETRIE, describing excavations at Memphis, said no instance of a stone-built tomb was known before the end of the Second Dynasty, when King Khasakhamui built a stone chamber at Abydos. Not till the latter part of the Third Dynasty did stone-built chambers become the custom, even for kings. The oldest stone tombs of subjects were those at Meydum, which were opened by the British School last winter. The great mastabas of Nefer-maat and another noble, close to the Pyramid of Sneferu, the interiors of which had defied modern search, were attacked in a thorough manner. The mound over the tomb, No. 17, was mined through to a depth of 45 ft. At the bottom was found a closed stone building, which had been completely buried beneath the mound, without leaving any external opening. The burial had, therefore, taken place before the mound was thrown up, and the burial must have taken place before the date of the Pyramid of Sneferu, 4650 B.C. This was the earliest private stone tomb that could be dated. The passages were lofty, and the great chamber was roofed with beams of stone, which weighed up to 40 tons each. In a recess at the end of the hall stood the sarcophagus of red granite, the oldest stone sarcophagus known. The burial was of the greatest interest, as it showed that the body was completely unfleshed before it was wrapped in linen. The bones had been completely stripped and severed, excepting that the spine was not dissevered. Each bone was then wrapped separately in fine linen, the spine was packed closely with linen, and linen was pressed into the empty eye-sockets. The skull, which was found with the rest of the bones, as compared with the usual Egyptian heads, was large, with narrow face, extremely orthognathous, and very narrow nose. The neighbouring tomb of the noble Nefer-maat was the largest of all, the size being 380 ft. by 206 ft. The burial of Nefer-maat, again, proved to have been an unfleshed skeleton.

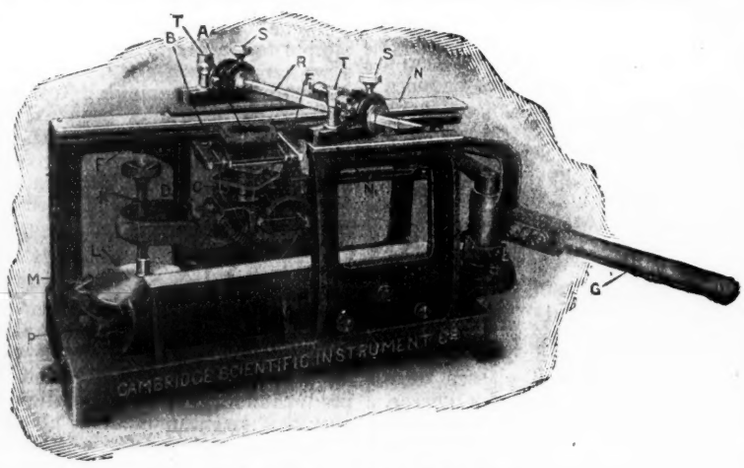

Fig. 2.—Large sliding microtome.

NEW SLIDING MICROTOME.

Dr. DUCKWORTH gave a description of a microtome recently designed by the Cambridge Scientific Instrument Company, Limited. The instrument was shown at the reception. The microtome is capable of cutting through decalcified bone or cartilage, and is useful for cutting sections too large to be cut with either of their two rocking microtomes. The following is a description of the instrument:

The object, embedded in a block A of paraffin wax or celloidin, is fixed to the wood block which is clamped in the object-holder B. This object-holder is fitted with orientating adjustments very similar to those used in the firm's rocking microtomes, being mounted in a cup-shaped socket at the end of a brass pillar E. This pillar can be raised or lowered and clamped at any height by the clamping screw D. The orientating adjustments are made by four screws one of which is lettered C.

The sliding carriage, which supports the object-holder and feeding mechanism, rests at three points on two guides in the frame of the instrument. The whole carriage can be moved backwards and forwards on these guides by

means of the handle G working through the levers H. The design is such that all wear is automatically compensated for. After the cutting stroke, and when the carriage has nearly reached the extreme position as in Fig. 2 (p. 792), a stop pin, operating through the ratchet M, turns the toothed wheel L and screw K so feeding the object-holder upwards. The amount of the feed is regulated and indicated by the index P. On the return stroke the mechanism causes that part of the sliding carriage which holds the object-holder to drop just before it reaches the knife R in order to avoid fouling the same, and to rise after passing the knife to its former position in preparation for the next cutting stroke.

The construction of the sliding carriage is such as to convert the feed into a parallel motion, and so give sections of a uniform thickness, and, further, since the carriage slides on plane guides, the sections are also from a plane surface. The knife R is clamped in two heavy brass clamps by the screws S S. The position of these clamps can be moved so as to set the knife obliquely to the direction of movement of the object. The clamping screws T T hold the clamps firmly in position. The angle the cutting edge makes with the horizontal plane is also readily adjustable, and a small angular scale is divided on the knife-holders, so that the same angle can be easily repeated. Two knives are supplied, each measuring 30 cm. long by 5 cm. wide.

The first one A is ground to a very fine angle, and is used for delicate work, as, for instance, with soft celloidin, fresh, or alcohol-hardened preparations. The second knife B is the most generally useful knife. It is not ground to such a fine angle, and is used with the majority of paraffin preparations and also with hard celloidin.

The microtome will cut sections measuring up to 150 by 120 mm. (6 by $4\frac{3}{4}$ in.) in either paraffin or celloidin. The thickness of the sections can be varied from 0 to 0.06 mm., each division on the scale being equal to 0.002 mm. The total distance through which the microtome will automatically feed the object-holder is 21 mm.

In using the instrument the user should be sure to have the cutting edge of the knife pointing towards the handle end of the microtome. Before clamping the knife in position the two small capstan-headed screws, situated at the back of the holders, should be slackened with a tommy pin. The knife can then be clamped by the screws (S S) with the flat side underneath. It can then be tilted to the desired angle and finally locked in position by the capstan-headed screws. The flat underside of the knife should be inclined to the horizontal, the best angle being determined experimentally for each particular piece of work.

When used for cutting paraffin sections it is customary to have the cutting edge at right angles to the direction of movement of the object. When cutting celloidin, however, it is necessary to use the knife at an oblique angle of about 30 degrees to this direction as illustrated in Fig. 1 (p. 792). During the process of cutting celloidin sections both the knife and the tissue should usually be kept constantly moistened with either 80 per cent. alcohol or with cedar-wood oil. The instrument is, however, capable of cutting dry sections. The two surfaces on which the carriage slides should be kept well lubricated. All that is necessary to ensure this is to keep a supply of oil in the troughs where these surfaces are situated. For convenience in handling the knives when stropping them a removable metal handle is supplied. The Cambridge Scientific Instrument Company also supplies special stropping attachment to ensure the correct cutting angle being maintained.

In the case of the knife A this stropping attachment is in the form of a wire which can be fixed to the flat side of the knife blade. This, in effect, makes the flat side hollow-ground, and both sides can then be stropped in the same manner as an ordinary hollow-ground razor.

In the case of the knife B a less acute cutting edge is required and the stropping attachment takes the form of a split tube which can be fixed to the back of the knife. This has the effect of making a more obtuse, and therefore a stronger, cutting edge.

Some of the principal advantages claimed for this microtome are:

1. It is extremely powerful, and will cut through decalcified bone and cartilage.
2. It will cut sections from very large objects.
3. It will cut either paraffin or celloidin sections.
4. It is designed on geometric principles, so that even after many years' wear it will still cut true sections.

EHRLICH'S NEW ANTISYPHILITIC REMEDY.

THE therapeutic action of arsenic in syphilis has long been recognized, but up to the time of the introduction of atoxyl no serious attempts appear to have been made to substitute arsenic for mercury in the treatment of this disease. The employment of atoxyl did not last long, as it was soon discovered that the toxicity of this compound was considerable and the advantages over the older mercurial preparations were not of a nature to justify the risk. Ehrlich realized, however, that arsenic would prove of great value in this field of therapeutics, and began a systematic investigation with the object of determining which compounds lent themselves best to the purpose. He aimed definitely at a *therapia sterilisans magna*. Arsazetin was brought out early, and proved itself possessed of a strong specific action. It was, however, too toxic for safe usage. Ehrlich achieved better results with his arseno-phenyl-glycin, a substance of which more may be heard in the future. After many patient experiments, during which 605 different preparations of arsenic were dealt with, Ehrlich began to investigate a substance which Bertheim had prepared chemically for him, and which had the chemical composition of a dioxy-diamido-arseno-benzol. The experiments were conducted by Ehrlich and Hata, and the substance has received, besides its chemical name, those of "606," "Ehrlich-Hata," and "arsenobenzol." The latter name is incorrect, and should be reserved for the substance from which "606" is built up. The bichloride of the substance is stable, but the sodium salt which is used for injection is very much the reverse. For this reason the former is put up in sealed tubes, and this should be converted into the latter by the addition of sodium hydrate just before use. The former is a yellow powder, which is soluble in methyl alcohol, hot water, etc. Since the various clinicians who have employed it have devised a large number of methods of preparing the solution for injection, we need not concern ourselves with these details at present, the more so since the substance cannot yet be bought in the market, and each investigator who wishes to use it would naturally have to study the literature after obtaining samples from Ehrlich.

Alt was the first to report on its pharmacological action. At a meeting of the Medizinische Gesellschaft in Magdeburg he read a paper[1] in which he recounted his experience of the preparation in syphilis in such glowing terms that it was believed that his enthusiasm was due to the newness of the remedy. In a later communication[2] he admitted that he had feared that his wonderful results might be interpreted in this manner, but in the meantime, a large number of others having obtained the same results, he boldly defied the critic to charge him with exaggeration. It would be impracticable to deal with all the communications which have appeared since Alt's first paper, nor is this now necessary, since Dr. Bresler[3] has published a neat little booklet in which he deals with the majority of the publications up to the middle of August of this year. After Alt had told the world that a single injection of 0.3 gram of "606" sufficed to clear up primary, secondary, and even tertiary lesions within the course of a few days, and to convert a possible Wassermann reaction into a negative one, Iversen,[4] in a remarkable communication, recounted how a single injection of dioxy-diamido-arseno-benzol succeeded in curing relapsing fever in 92 per cent. of the cases. In 3 out of the 4 cases in which relapses took place after the injection, no spirochaetes could be found, notwithstanding diligent search. Ehrlich and his assistants had previously been able to cure relapsing fever in mice and rats by one injection. Iversen applied the medicament both intramuscularly and intravenously, and came to the conclusion that the therapeutic dose for relapsing fever was 0.2 to 0.3 gram. During the following months a large number of clinicians tested the action of "606" in syphilis, and with one accord sung its praises in their reports. The extraordinary rapidity with which it acted

[1] Alt, *Muench. med. Woch.*, No. 11, 1910.
[2] *Muench. med. Woch.*, No. 34, 1910.
[3] *Die Syphilisbehandlung mit dem Ehrlich-Hata'schen Mittel.* By Dr. Johannes Bresler. Second edition. Halle: C. Marhold. 1910. Pp. 65. (1s. 9d.)
[4] Iversen, *Muench. med. Woch.*, No. 15, 1910.

appears to have struck every one. Wechselmann[5] stated that the curative action was so rapid that the patients could not be demonstrated with advantage. This author reported a number of cases in which the cures, or rather disappearance of symptoms, were little short of miraculous. He was especially gratified by the results obtained in malignant cases which had resisted medication with mercury and potassium iodide. Cases of bad prognosis were recorded in which the remedy, in spite of apparently approaching death, succeeded in restoring health within a few days or a week or two. Up to August of this year no adverse reports, as far as concerns the removal of symptoms, were published. The lay press in Germany and France took up the subject with enthusiasm, and "interviews" with Ehrlich, Hallopeau, and Gaucher *inter alios* were given in sensational style in *Le Journal*. Some dissatisfaction was expressed by a few that the drug was not readily obtainable, but this appears to be unjustifiable, since Ehrlich had distributed in the most open-handed manner possible sufficient quantities to the directors of clinics with a large venereal *clientèle*. The drug is not to be placed on the market until Ehrlich has collected records of from 20,000 to 30,000 cases.

While a large number of the publications deal more or less exclusively with clinical records of the visible improvements in bad cases, a few deal with the subject in an inquiring spirit, and of these those of Neisser[6] and Blaschko[7] deserve special mention. It is necessary, however, briefly to state before passing on to these papers that Taege[8] and Duhot[9] independently reported cases of a syphilitic mother, with an infant badly infected with hereditary syphilis, being treated by injection, and the infant suckling at its mother's breast becoming completely freed from all signs of the disease within a very short time. Neisser was struck by the fact that only 10 per cent. of the cases treated with this new remedy showed a transition from a positive to a negative Wassermann reaction, while recurrences were also observed in some cases. Neisser himself leaves it an open question whether these results may not be due to the smallness of the doses employed. Other observers (Lange, Fraenkel and Grouven, etc) confirm the find as far as the Wassermann reaction is concerned, and Lange found that some cases which gave negative reactions before treatment became positive after injection. This was also confirmed by others. In many cases this change was transient, while in others it appeared to be more or less permanent. In spite of this, Neisser stated that there can be no doubt as to the specificity of the drug, and that he awaits further observations before deciding whether it cures absolutely or not. Blaschko came to the conclusion that while a perfect cure does not occur in all cases, and while it is not probable that a well-established constitutional syphilis could be cured right off with a single injection in the doses now employed, the prospect of a *therapia sterilisans magna* in early cases appears to be good. He laid certain indications for its use, and was hopeful that great things may be done in these case. They include cases in which mercury has failed to cure, cases in which mercury is not well tolerated, cases in which, in spite of mercury, recurrence of symptoms occurs, and very early cases. He further believed that the medicament might be given with advantage in cases with fresh constitutional symptoms which had not yet been treated with mercury, or in combination with mercury or iodide, in recurrent cases, and also in parasyphilitic affections.

With regard to the disadvantages of the preparation but little can be said. The majority of the authors report that, with the exception of some pain and infiltration (this may be severe) at the site of injection, and occasional rise of temperature, transient rash, and even vomiting, no ill effects result from the injections, and that, provided it is not employed in cases with advanced organic degenerations, no risk attends its use. Fraenkel and Grouven[10] report the sudden death of a young waiter who was treated by intravenous injection of "606" in rather high concentration. At the *post mortem* examination extensive cerebral disease, a flabby, atrophic heart, hypoplasia of the kidney, enlargement of the spleen, and engorgement of the liver were found, and Ehrlich[11] is unwilling to regard this case as justifying a condemnation of the intravenous application of the remedy. Bohâc and Sobotka[12] reported 3 cases out of 14 which revealed serious toxic effects of the injections. These included retention of urine, disappearance of the patellar reflexes, tenesmus, and constipation. Ehrlich appears to have made inquiries of the other investigators as to the occurrence of these symptoms; but Alt, Doerr, Finger, Neisser, Michaelis, and others replied that they had not observed anything similar in all their cases. Sellei suggested that the symptoms observed were due to methyl alcohol used in dissolving the powder. This explanation was not accepted either by the authors or by Ehrlich, since only very small quantities were employed. Two infants died shortly after injection in Wechselmann's clinic, but in these cases Ehrlich suggested that, inasmuch as the death took place after all the signs of congenital syphilis had disappeared, and no evidence of arsenical poisoning could be obtained at the *post-mortem* examinations, the death should be ascribed to a sudden setting free of endotoxins from the killed spirochaetes, and advised that infants whose nutrition is not good should not be treated in this manner.

Wechselmann and Lange[13] report that they have succeeded in preparing the solution in such a manner that it can be injected without pain. Lastly, mention must be made of the fact that the injections are at times followed by Herxheimer's local reaction. Neisser (loc. cit.) regarded this as evidence of the specific nature of the pharmacological action.

In conclusion reference must be made to an excellent article by Bayet, in which the whole subject, as well as his own observations, is dealt with,[14] and also of the fact that the treatment is being tried in London both at the Lock Hospital[15] and the London Hospital.[16] The results in this country are said to be extremely good; and McDonagh goes further than most observers in claiming that there is no doubt that "by Ehrlich's genius the greatest victory over syphilis has been gained . . . and we know that we are on the right road to find an absolute cure for a disease which is a curse to mankind." On the other hand Bouchard, in a recent communication to the Académie des Sciences, is decidedly hostile to the claims made on behalf of the new remedy.

LITERARY NOTES.

At the recent Pharmaceutical Conference a sketch of the life and work of John Ray was given by Mr. G. Claridge Druce. It was published in full in the *Pharmaceutical Journal* of July 30th. John Ray, or, as he then spelled his name, Wray, entered St. Catherine's Hall, Cambridge, on June 28th, 1644. Two years later he migrated to Trinity College, and in 1649 was chosen Junior Fellow. In 1651 he took his Master of Arts and became a Senior Fellow of the college. He became the tutor of Francis Willughby, of Middleton Hall, who had the same love for natural science as Ray, and his name appears with that of Ray on a paper dated July 23rd, 1659, which Mr. Druce purchased, with some other autographs, from the late W. Pamplin. The list is dated 1656 and 1657, and, therefore, three or four years earlier than Ray's first publication, which was a small duodecimo volume of 182 pages, printed at Cambridge, entitled *Catalogus Plantarum circa Cantabrigiam Nascentium*. In 1662 he was deprived of his Fellowship for refusing to sign the declaration against the solemn league and covenant. From 1663 to 1665 he was travelling abroad with Willughby. In 1670 he published his first work on the general flora of Britain, under the title of *Catalogus Plantarum Angliae*, 1670, an octavo volume of 358 pages, and enumerates about 1,050 species of plants —a smaller number than that given by How in the *Phytologia* of 1650, which contains 1,200 species, or by Merrett in his *Pinax* of 1666, in which more than 1,400 are enumerated; but Ray has been much more careful in selecting undoubted natives, and in avoiding the introduction of mere forms or varieties. In 1682 appeared his

[5] Wechselmann, *Berl. klin. Woch.*, No. 27, 1910; *Deut. med. Woch.*, No. 32, 1910.
[6] Neisser, *Deut. med. Woch*, No. 26, 1910.
[7] Blaschko, *Berl. klin. Woch*, No. 35, 1910.
[8] Taege, *Muench. med. Woch.*, No. 33, 1910.
[9] Duhot, ibid., No. 34, 1910.
[10] Fraenkel and Grouven, ibid., No. 34, 1910.
[11] Ehrlich, ibid., No. 35, 1910.
[12] Bohâc and Sobotka, *Wiener klin. Woch.*, No. 30, 1910.
[13] Wechselmann and Lange, *Deut. med. Woch.*, No. 34, 1910.
[14] Bayet, *Journ. méd. de Bruxelles*, No. 35, 1910.
[15] McDonagh, *Lancet*, September 3rd, 1910.
[16] J. McIntosh (in Recurrent Fever), *Lancet*, September 3rd, 1910.

Methodus Plantarum Nova, an octavo of 166 pages, which contains a natural arrangement of plants based chiefly on the characters of the fruit, but he still adhered to the ancient division of the vegetable kingdom into trees, shrubs, and herbarium plants. This work foreshadowed his great work, the *Historia Plantarum*, in two folio volumes, one of 984, the other of 985 pages, which appeared in 1686 and 1688. In that work Ray everywhere distinguished British from exotic plants, and gave the place of growth and time of flowering; 6,900 plants were described. In 1688 he also issued his *Fasciculus Stirpium Britannicarum*, an octavo volume in which several new British plants from Wales and Cornwall were given. In 1690 appeared the *Synopsis Methodica Stirpium Britannicarum*, a small octavo volume of 317 pages, dedicated to Thomas, son of his old friend Francis Willughby. This book was so much in advance of previous works that it became the pocket companion of every British botanist. In 1690 he supplied to Gibson the provincial catalogues of plants which appeared in Camden's *Britannia*. In 1696 he issued a second edition of the *Synopsis*, but the numerous additions, nearly one hundred in number, were chiefly due to auxiliaries, Ray's advancing years and infirmities necessarily curtailing his field work. In 1704 a third volume of the *Historia* appeared. He died at the age of 78 at Black Notley, on January 17th. 1705, and a monument is erected there to his memory. There was no doubt, said Mr. Druce, that Ray was one of the greatest students of botany which Britain has produced, and whose labours and example have done so much, not only for his own time but for succeeding ages. His European herbarium and letters are in the British Museum, and there is a portrait and bust of him at Trinity College, Cambridge. Linnaeus perpetuated his name in the plant genus *Rajania*, and a genus in ichthyology is also called *Raia*. Mr. Druce exhibited a copy of the first edition of the *Synopsis*, which was purchased at Dr. Sibthorp's sale, and is said to have belonged to the Oxford Professor of Botany, Dillenius, who edited the third edition of Ray's *Synopsis*. The historian says:

> Mr. Ray was a man of excellent natural Parts, and had a singular vivacity in his Style, whether he wrote in English or Latin, which was equally easy to him. In a word, in his Dealings, no man more strictly just; in his Conversation no man more humble, courteous, and affable; towards God, no man more devout; and towards the Poor and Distressed no man more compassionate and charitable according to his abilities.

It is a thing which must strike even the casual reader that the people of Rome in the days of the Empire present many points of resemblance with the citizens of our great modern capitals. In nothing, perhaps, do these ancient lords of the world, in the period of their decadence, resemble us so closely as in the intense interest they displayed in their bodies and their eagerness to adopt all possible means of keeping them in health. It may not be so generally known that the means employed by the Roman in the reign of Augustus or Nero to preserve or recover his physical fitness were very much the same as those in vogue at the present day. Dr. H. Maegeli-Akerbloom, *Privatdocent* of the History of Medicine in the University of Geneva, has published an article on this subject in the *Revue Suisse de Médecine* for April, 1909, in which the close analogy between twentieth century hygiene and that of ancient Rome is very clearly shown. In "L'Hygiène chez les Romains au temps d'Auguste," Dr. Maegeli-Akerbloom gives a detailed account of the different exercises, diets, etc., which were fashionable at that time in Rome. The chief authority he cites is Celsus, who, whether he was a physician or not, gives advice on health, marked with sound common sense. For instance, he protests strongly against the danger and folly of athletic training in everyday life. Men who have been trained in the way athletes train themselves age quickly and become worn-out and ill. He advocates moderation in all things—in sleep, in exercise, in eating and drinking—and he holds that change of diet, as well as change of air, is necessary for health. The state of the appetite should be the guide to the proper amount of nourishment to be taken at each meal. The chief interest of Celsus's book, however, lies in the advice he gives as to the various "cures" for different ailments. Many of them are familiar enough to modern ears. Then, as now, massage played an important part in these hygienic régimes; it was used in cases of fatigue, with baths similar to those now known as Turkish and others; in acute febrile diseases massage was used, even for meningitis, in the hope of sending the patient to sleep. A complete rule of life is laid down for patients suffering from phthisis or any chronic disease, and also for those afflicted with disordered stomach For the former Celsus recommends travel, with the object, it would seem, of ensuring plenty of movement, for as well as sea voyages, travelling in litters or carriages is advised, whilst those too poor to indulge in this kind of jolting are advised to swing themselves in a bed or hammock suspended from the ceiling. If even this is out of the question, the patient should raise one of the feet of his bed by means of a piece of wood, or the like, and rock himself backwards and forwards as much as possible. The treatment for stomach troubles was more elaborate. The patient was advised to walk, fence, or take exercise in any way that would call into play the muscles of the upper part of the body. Reading aloud was also recommended. He was recommended to take but two meals a day and drink only light wines; cold drinks must be taken only after meals, though the wine should be warmed if the patient drank it fasting. Some sound advice is given as to the precautions to be observed in an epidemic. Celsus warns people to avoid fatigue and excess of every kind, and also sudden changes of temperature. He has been dead some nineteen hundred years; yet much of his book might have been written yesterday, and many of his counsels might be followed with advantage to-day by those who vainly seek for health of mind and body in patent medicines and secret remedies.

Perhaps few people realize that the British army, which to-day prides itself upon its loyalty to the Crown, owes its existence to men who had rebelled against their lawful sovereign. Before the outbreak of the civil war in the seventeenth century, no such thing as a standing army existed in England. The first attempt at a regular military service, in the modern sense of the word, was made by Cromwell when he raised and organized the Parliamentary forces. At the Restoration, Charles II took these troops bodily into his own service; and thus was formed the neucleus from which was ultimately evolved the British army as it stands at the present day. Major H. A. L. Howell, R.A.M.C., in an article entitled "The Story of the Army Surgeon and the Care of the Sick and Wounded in the British Army, from 1660 to 1688," published in the *Journal of the Royal Army Medical Corps* for January, 1910, has given a most interesting and instructive account of the condition of the army, and the position of the military doctor under the last Stuart kings. From him we learn that during the latter half of the seventeenth century, each cavalry regiment had its own surgeon, whilst the infantry rejoiced both in a surgeon and a surgeon's mate. Moreover, the men sent out on detached duty were always accompanied by their medical attendant, in the form of a surgeon's mate. On active service, besides the regimental surgeons the army had also the benefit of a physician with an assistant apothecary, who were attached to the staff of the commanding officer. All the practitioners belonging to the army appear to have ranked as staff officers, for in an old pay list of Cornwall's regiment (now the Norfolk), dated 1686, the names of both the surgeon and his mate appear directly after that of the major, and before those of the adjutant and the quartermaster. The pay of the military doctor varied, of course, according to his rank. The usual amount received by the surgeon was 4s. a day, his "mate" reciving 2s. 6d., whilst the physician of an army in the field drew as much as 10s., and the apothecary 5s. a day. The surgeon, however, had means of augmenting his pay. Major Howell says:

> At this time, and for nearly a century after, it was not unusual to find surgeons holding double commissions. The surgeon purchased a commission as an ensign, and drew, in addition to an ensign's pay, 2s. 6d. a day for hospital duty. On promotion such officers usually gave up the surgical part of their duties.

In those days all drugs required by the troops were supplied by the Crown. Major Howell quotes the Royal Order issued in 1673, by which Charles II settled the sum of money to be expended yearly upon medicine for his army. The decree runs as follows:

> Whereas, for the preventing of the great and uncertain charges of Apothecaries' bills of physic and internal medicines

for sick soldiers, We have thought fit to allow forty shillings a year to Richard Whittle for providing of physic and internal medicines, besides the forty shillings for each company allowed to the Surgeon of the Regiment of Our Foot Guards for external medicines yearly, which said allowance of forty shillings yearly for physic or internal medicines to commence from the twentieth of September last. Our Will and Pleasure, therefore, is that you take notice thereof, and give it in orders, that when the non-commissioned officers and private soldiers respectively shall be sick, the said Richard Whittle may be applied to for internal medicines, as well as hurt men are to apply to the surgeon of the Regiment for external medicines when they need the same. Given at Our Court at Whitehall, the 24th day of January, 1673.

Charles seems to have been anxious for the well-being of his sick and wounded soldiers, and took a great interest in the hospitals erected for their use, such as the hospitals at Chelsea and Kilmainham, in Dublin, which were built during his reign, and were intended especially for men disabled in the service of their country. When a military hospital was established at Tangier during the war, £547 10s. was allowed towards its support. We possess a few interesting details concerning the latter hospital: its staff consisted of a physician, a surgeon, and a surgeon's mate at the usual rate of pay; and it seems to have possessed a well-stocked pharmacy, to judge from the compensation paid after the capture of Tangier by the Moors. As much as £20 was allowed to "the Chirgeon in Charles Fort, Tangier, for several medicaments and Instruments of Surgery left there." When, during the Dutch war of 1664, there was a lack of accommodation for the wounded men, half the hospitals in the kingdom were set aside for them; and in London St. Thomas's gave up half their beds for the same purpose. The army doctor of that period did not confine his attention solely to his professional duties, but took his share of fighting when the occasion arose. He accompanied his regiment into battle, and we hear of one White, described as a military "doctar," who, during the British occupation of Tangier, volunteered for an expedition into Morocco, where he fell with the rest of his companions, who were almost completely annihilated by the Moors. It is a curious fact that few of the military doctors of that time occupied the front rank of the medical profession. Nevertheless, it is evident that some progress was made in military surgery. A primitive form of tourniquet, which consisted of a piece of wood placed under the bandage which encircled the limb, was introduced by von Hilden (1560–1634); and later on, at the siege of Besançon in 1674, the block tourniquet made its appearance under the auspices of Morel. Also, about this time—in 1679, to be exact—flap-surgery, once practised in ancient Rome, was introduced into this country by Lowdham, an Oxford surgeon. But, in spite of these advances along the thorny path of knowledge, surgery, and particularly surgery in the field, remained a rough and ready art until nearly a century and a half after "good King Charles's golden reign."

THE WINTER SESSION IN THE MEDICAL SCHOOLS.

THE arrangements in view for the opening of the winter work at most of the medical schools will be found in the following paragraphs. The Deans of some other schools have been good enough to fill in the forms sent to them, but as the forms have been returned without signature or other indication of the institutions to which they relate, it is impossible to utilize them.

ST. BARTHOLOMEW'S HOSPITAL.—The opening ceremony will be the old students' annual dinner on October 3rd. This will be held, as usual, in the Great Hall of the hospital, at 6.30 for 7 o'clock. The chair will be taken by Mr. C. B. Lockwood.

ST. THOMAS'S HOSPITAL.—The winter session will commence on October 4th without formal ceremony. The annual dinner of old students will take place the same evening at the Hotel Cecil. The chair will be taken by Mr. W. F. Haslam.

ST. GEORGE'S HOSPITAL.—The winter's work will be inaugurated at 3 p.m. on October 1st by a prize-giving ceremony and an address by Dr. Squire Sprigge on "Prizes." The ceremony and address will be followed at 4.15 by the annual meeting of the St. George's Club. The old students' annual dinner will be held the same evening at Prince's Restaurant, Mr. G. R. Turner being in the chair.

THE LONDON HOSPITAL.—Work for the winter session will begin on Saturday, October 1st. On the following Monday, at 3 p.m., Mr. Robert Hutchison will deliver the Schorstein Lecture. The old students' annual dinner will take place the same evening at the Hotel Cecil, Mr. Mark Hovell in the chair.

KING'S COLLEGE HOSPITAL.—The winter's work will commence without formal ceremony on Saturday, October 1st. The dinner of past and present students will be held on Monday, October 3rd, at the Waldorf Hotel, Dr. John Phillips presiding.

WESTMINSTER HOSPITAL.—As in recent years, term will commence without formal prelude on October 3rd, while the annual dinner of past and present students will take place on Thursday evening, October 6th, at the Imperial Restaurant. The post of chairman has not yet been allotted.

ST. MARY'S HOSPITAL.—The winter session will commence on October 3rd, when the prizes and awards for the sessions 1909–10 will be presented by Sir Conan Doyle in the Medical School Library. The annual dinner of past and present students will be held on the same date at 7 p.m. at Prince's Restaurant, Mr. Ernest Lane in the chair.

THE LONDON SCHOOL OF MEDICINE FOR WOMEN.—The winter work will be inaugurated at 4 p.m. on Monday, October 3rd, by an address from Mr. E. W. Roughton on Woman's Sphere in Medicine. The ceremony will take place, as usual, at the school buildings, 8, Hunter Street, Brunswick Square.

MIDDLESEX HOSPITAL.—The winter session will commence on October 3rd, when an introductory address will be delivered by Mr. Salmon Nowell; a prize distribution will follow. The annual dinner of past and present students will take place the same evening at the Trocadero at 7 o'clock, Mr. T. H. Kellock in the chair.

CHARING CROSS HOSPITAL.—The winter session will be opened on October 3rd by the annual distribution of prizes. The ceremony will take place in the out-patients' hall of the hospital at 3.15 p.m., the prizes being handed to the successful students by Lady Juliet Duff. Subsequently the eighth Harley Lecture will be delivered by Dr. F. W. Mott, its subject being, "The Hereditary Aspect of Nervous and Mental Diseases." The dinner of past and present students will be held the same evening at the Criterion Restaurant, Mr. Daniel in the chair.

UNIVERSITY COLLEGE HOSPITAL.—The winter term will be inaugurated on October 3rd by a prize-giving ceremony in the library of the school at 3 p.m., and followed by an address from the Very Reverend the Dean of Salisbury on self-development. The dinner of past and present students will be held the same evening at the Gaiety Restaurant.

UNIVERSITY COLLEGE, LONDON.—Work in the medical department of the Faculty of Science will commence on Tuesday, October 4th, without any inaugural ceremony.

GUY'S HOSPITAL.—Term will commence without formal ceremony on Monday, October 3rd. The event will, however, be marked by the holding of the first meeting of the Pupils' Physical Society on the following Friday. This will take the form of a *conversazione* in the Wills Library, where the guests will be received, at 8.30 p.m., by Sir Samuel Wilks, supported by the honorary vice-presidents.

NORTH-EAST LONDON POST-GRADUATE COLLEGE. — The winter session will commence on Thursday, October 27th, being inaugurated by an address from Sir Lauder Brunton on "The Value of Blood-pressure Observation in Medical Practice."

MEDICAL GRADUATES' COLLEGE AND POLYCLINIC.—The winter term lectures commence on Monday, October 3rd, on which date, at 5 p.m., Dr. Robert Jones, of Claybury Asylum, will deliver an address on the teaching of insanity in the British Isles.

QUEEN'S UNIVERSITY OF BELFAST.—The winter session in the Medical Faculty will open on Tuesday, October 11th, without any inaugural ceremony.

UNIVERSITY COLLEGE, CARDIFF.—Work for the winter session in the medical department of University College, Cardiff, will commence on Tuesday, October 4th, without formal ceremony.

TRINITY COLLEGE, DUBLIN.—Work for the winter session in the School of Physic will commence on October 1st, without formal ceremony of any kind.

UNIVERSITY OF BIRMINGHAM.—Work for the winter session in the Medical Faculty will be inaugurated on Monday, October 3rd, by a reception and *conversazione*. There will be no formal address. The annual dinner will be held in January, as usual.

UNIVERSITY OF LIVERPOOL.—Work for the winter in the Medical Faculty will commence on Tuesday, October 4th, being inaugurated by the delivery of an address by Dr. A. B. Macallum, Professor of Physiology in the University of Toronto. The annual dinner will be held the same evening, Professor Paul in the chair.

UNIVERSITY OF DURHAM.—The winter session will commence on Monday, October 3rd, without any formal opening ceremony.

UNIVERSITY OF LEEDS.—An address inaugural to the commencement of the work of the winter session will be delivered on October 4th by Professor Howard Marsh, of Cambridge. The annual dinner will be held the same evening at the Queen's Hotel.

UNIVERSITY OF EDINBURGH.—Work in the Medical Faculty will commence on Tuesday, October 4th. There will be no special ceremony, but each professor will deliver a short introductory address to his students.

UNIVERSITY OF ABERDEEN.—The winter session in the Faculty of Medicine opens on Thursday, October 13th, without any official ceremony.

British Medical Journal.

SATURDAY, SEPTEMBER 17TH, 1910.

DOSIMETRY AND THE REPORT OF THE SPECIAL CHLOROFORM COMMITTEE.

THE contents of the full report of the Special Chloroform Committee and the discussions held in the Anaesthetics Section of the British Medical Association during the recent meeting, afford yet another proof that finality in medical matters can hardly be attained. As science must ever be in flux so must the ancillary arts undergo corresponding changes. Since the days of Nepenthes and Letheon the mind of man has sought for means whereby humanity may escape the suffering incident to the curative efforts of the surgeon's knife. The late Sir James Paget has depicted with almost too painful realism what those sufferings were before the days of modern anaesthesia. Opium, alcohol to drunkenness, nerve compression as practised by Moore, bleeding to syncope, and the ministrations of Father Hell and the hypnotists were but ineffectual measures, and a new era opened when Sir Humphry Davy published his researches on the gases and incidentally on the action of nitrous oxide. But even before the tragedy of Horace Wells's attempt and failure to demonstrate to an unsympathetic audience true anaesthesia by inhalation, Crawford Long had used ether in practical surgery as an anaesthetic, and so anaesthesia, as we now know it, had become an accomplished fact. This was in 1842, and the documents proving Long's discovery formed one of the most interesting exhibits in the museum collected for the recent meeting. The vigorous advocacy of Sir James Y. Simpson, as well as its own inherent qualities, soon, however, gave to chloroform the premier place among anaesthetics. In spite of its dangers, too patent to be disguised or ignored, it has maintained that position ever since 1847. If the most fatal through its potency, chloroform remains the most convenient and most widely used of anaesthetics.

Those who are curious in such matters must know that some hundreds of drugs from time to time have been exploited as substitutes for it, and men have sought salvation in mixtures containing it as an ingredient, and carefully devised methods of giving it. There have been pessimists who, likening chloroform to the upas tree, have decried its use in any form, lest the bones of its victims bleach beneath that tree's outspreading branches. Thus, spinal analgesia and local infiltration have been often vaunted as a necessary reform whereby chloroform may be entirely superseded. In the Sections of the Navy, Army, and Ambulance, and of Anaesthetics, these matters were discussed, and we are reminded that enthusiasm, like ambition, is apt "to o'erleap itself." The relations of the anaesthetic to surgical shock, and the more recent pronouncements in favour of ether as an anaesthetic, were germane to our contention that, with our present knowledge of all the suggested alternatives to the use of chloroform, none stand forth so convincingly as to wrest from it its dominating ascendancy. The newer methods may appeal to the human thirst for novelty, but dispassionate examination reveals unforeseen perils and unanticipated drawbacks. In a generation in which nerves bulk largely no spinal method of analgesia will appeal to all, for, with mind set on edge, the patient remains conscious that he is undergoing an operation, and that upon its success his very life depends. At least, chloroform will spare him such an ordeal, and he demands that its use may be robbed of its dangers. The work of the Special Chloroform Committee has been directed to this end, and the perusal of its report and of the discussion on dosimetry of chloroform which took place in the Anaesthetics Section will reward the reader for his pains. Dosimetry, we are told, is no new application of exact knowledge; it was taught by Snow and Paul Bert, and the elaborate report with which we are dealing reviews all that has been done by experiment and in practice from their day until this present time. The experiments which form the basis of the report have been done partly by members of the Committee and partly by outside workers.

These physiological findings and a large mass of clinical material constitute the evidence which the report presents to its readers, and upon this evidence rests its more convincing pronouncements. These are to the following effect: Chloroform produces anaesthesia in all persons when its percentage vapour in air is as two is to one hundred. For induction this percentage is safe within the experience of the Committee and others; prolonged inhalation of chloroform calls for lowering of the strength of the vapour inhaled. This 2 per cent. maximum adopted by the Committee agrees with the results arrived at by Snow and Paul Bert and is what Waller has consistently urged for many years past. The Committee has attempted to carry conviction by pointing out the direct effects of 2 per cent. and lower percentages upon individual tissues and upon the organism as a whole. It shows, as indeed is common knowledge, that the effects of chloroform are directly proportional to the dose inhaled, and that the area of narcotization of the central nervous system is increased *pari passu* with the strength of the vapour inhaled and the length of time during which the inhalation lasts. Thus, when a higher percentage is employed or the 2 per cent. is persisted in, the blood pressure steadily falls and respiration as steadily grows weaker through the effect of the drug upon the central nervous system.

The report's first claim to recognition is that it emphasizes a principle; everything else is matter of detail and permits of adjustment. In the discussion on dosimetry voices were raised in favour of a "plenum" system of inhaler rather than a "draw-over" system, and many contended that the former was immeasurably important. It is, however, far more urgent, if we are to accept the statements of the report, for us to grasp the principle that with dosimetric methods chloroform can be used with safety; without such methods its safety depends entirely upon the acumen and experience of the administrator. Of course, it is not contended that any method can be safe unless the user understands his business, but we affirm that the better the method the better can competent persons perform their business. Whether or not the maximum for everyday practice should be fixed at 2 per cent. may be open to criticism, but the evidence advanced in its favour is certainly very strong. It may be urged, as indeed was done during the

discussion, that the exigencies of modern surgery often demand more than mere anaesthesia. In certain contingencies an intensive effect upon the respiration and central nervous system must be faced or the surgeon's art is hampered. But here, again, it appears to us that the report meets the difficulty, and while admitting that in such cases risks must be run and a higher strength of chloroform vapour than 2 per cent. may be inhaled, it urges that the risk is minimized if the administrator recognizes it is a risk and if he adopts a dosimetric method which allows him to vary his percentage according to the necessities of the case and the moment.

Another aspect of the question is that to which Dr. Waller has more than once adverted. A student or practitioner who has been trained to work with a dosimetric instrument which delivers to the patient definite percentage strengths of chloroform in air in such a way that the administrator can see the record of the proportions he is giving, and can watch its effects upon the person inhaling, learns to apprehend the correlation between causes—percentage doses of chloroform—and effects—the degrees of narcosis produced. He is no longer an empiric using a drug of which he knows little or nothing, and watching for effects the possible onset of which he knows less; he becomes the scientific worker following an exact method, a method enabling him to control effects by controlling the dominant factors of their causation.

The report is no mere academic discussion upon the pharmacology of chloroform. It has essentially a practical side, which permeates all its sections, and so it becomes a ready means whereby a practitioner who has not seen dosimetric inhalers used can master the technique. In this appears to lie one of its chiefest merits, and it certainly justifies the encomium which Mr. Butlin passed upon it in his presidential address when he said that its publication marked an era in our knowledge of anaesthetics.

"606."

THE code of medical ethics forbids the scientist to use advertisement in the strict sense of the word, and the medical profession is so strict in enforcing this written and unwritten law that the scientist cannot turn, like the ordinary business man, to profitable account the fruits of his work. Chemists are not hampered by such a code, and are therefore permitted to employ many means of attracting the notice of the world at large to their achievements. Nevertheless, in the history of the medical laboratories during the last quarter of a century several methods have been successfully adopted to bring discoveries of significance to the immediate notice of the laity. Koch made his startling announcement of the discovery of the tubercle bacillus before a meeting of a medical society to which members of the general public had no access, but to which representatives of the lay press had admission. Later, he introduced the method of labelling his tuberculin preparations by letters instead of names, a method which appears to have attracted attention, and which von Behring and others employed with success. The latest innovation of this kind is the naming of a chemical substance —the mono-sodium or bi-sodium salt of the bichloride of dioxy-diamido-arseno-benzol—by a number. Ehrlich and Hata have shown much shrewdness in calling this substance "606," since the mystery which surrounds the term in the eyes of the public has made people anxious to find out something about the substance which it notes. The German and French daily press have fed the curiosity of the public, not without some exaggeration, and the result has been striking. The spas in which syphilis is largely treated seem to fear that their days are numbered; patients clamour to be treated by the wonderful new remedy, and are little inclined to leave it to the physician to decide whether the case is really suitable for this treatment.

At the present moment it is difficult, if not impossible, to determine the full value of this new remedy, but certain facts are already available from the reports of nearly 3,000 cases treated in various clinics by the most competent observers. From these facts some deductions can be made. It is quite certain that the new remedy is capable of changing the clinical aspect of a case of syphilis in any of the three stages within a surprisingly short space of time and as the result of a single injection. While it yet remains to be decided by experience whether it is better to apply the drug subcutaneously, intramuscularly, or intravenously, and which is the best manner of preparing the solution for injection, it is practically certain that in the most desperate cases of syphilis, in which mercury is of no value and which otherwise tend to run a rapid course ending in death, health can, temporarily at any rate, be restored almost miraculously by a single injection of "606." Its specificity cannot be doubted, we are told by Neisser, an authority whose word will be accepted all over the world.

The question will be asked by all: "Is the cure permanent?" To this no certain reply can as yet be given. Neisser looks to the Wassermann reaction for an answer, and finds that only in 10 per cent. of his cases has the positive reaction been changed into a negative. Others find that this change takes place in a considerably higher proportion. But it must be admitted that the significance of the reaction is not so certain as to make it possible to answer so vital a question on this evidence alone. If Wassermann's reaction depended on the presence of a syphilitic antibody in the serum of syphilitics, it would be reasonable to expect a persistance of this antibody after complete cure. Lange, however, tells us that we must be chary in speaking of a reaction becoming negative, and advises the practitioner to regard the change as a weakening of the positive reaction. The reaction is possibly dependent on an adsorption of complement by globulin or other proteid substance thrown out of true solution. If this be so, we obviously know too little about the action of the toxic products of the virus on globulins to decide whether this could only take place as long as the virus is alive in the body.

The best results with "606" so far reported appear to follow injections into the gluteal muscles. Alt and others believe that the effect of this "dépôt" medication is more likely to be lasting than when the substance is thrust directly into the circulation. Investigations show that some time after the injection arsenic is to be found in the site of the injection. It is, therefore, reasonable to hope that from such a dépôt sufficient active substance could be absorbed effectually to sterilize the body of spirochaetes. Ehrlich has shown that the preparation acts directly on the parasites and not on normal tissue, but it has further been found clinically that under its influence syphilitic tissue is actually absorbed. The observation that an infant suffering from congenital syphilis

of a very severe type can apparently be cured by taking the breast of its mother after she has received a single injection of "606" suggests not only that the drug is specific, but that it is powerfully specific.

We are inclined to believe, as experience in other cases has taught us, that we have not yet learned how toxic the preparation is. Meantime we note that, among some 3,000 cases treated with the remedy, death has resulted in two almost moribund infants, in one young man, and two other adults whose central nervous system was much affected by disease, and in a fourth adult case. Ehrlich has from the first, however, declared that the drug must not be employed in cases of marked organic disease, especially of the central nervous system and of the cardio-vascular system, and it would therefore seem, up to the present, that no risk to life is associated with its application in suitable cases. It is, however, much too early to speak definitively on this point. Another matter of importance is the possible effect of the drug on the optic nerve. This is of very special interest in view of experience in connexion with other arsenic derivatives.

We must also wait for months and years before we can ascertain whether the first injection affects the virus in such a way as to render it refractory to a subsequent application should recurrence of symptoms occur. Time, too, will reveal whether recurrences will occur frequently or not after injection with "606." In the meantime, it may be said with some confidence that Ehrlich has given us, by means of systematic scientific research, a highly valuable medicament, and has perhaps solved the problem, as far as syphilis is concerned, of intravital sterilization.

THE WAR AGAINST TUBERCULOSIS.

IN the contest which medical science constantly maintains against disease no more interesting issues arise than those which are concerned with the strategy adopted to secure conquest over the more powerful and ubiquitous enemies of mankind whose ravages have been so enormous as to constitute them veritable plagues. In many instances the battle has been conducted to a successful issue, and such allies of the "grim tyrant" as small-pox, typhus fever, malaria, diphtheria, and yellow fever, have been compelled to strike their flags and range themselves among the vanquished foes of the human race. Of those which remain to be subdued, the two most important are cancer and tuberculosis. With the former we are not now specially concerned, though it may be said in passing that, by means of special research organized on co-operative principles, in addition to individual effort exerted along many lines of original investigation, cancer is being slowly but surely driven from its strongholds, and the day may not be far distant when the secret of its aggressive activity will be revealed, and it, too, brought into line with those other enemies of human life and health which have already capitulated to the determined bombardment of scientific inquiry and inductive reasoning.

With regard to tuberculosis the position is somewhat different, because the progress of the fight is more advanced, and several important outposts have already been captured. Thanks to the pioneer work of Koch, we are familiar with the micro-organic battalions by the aid of which it wages its warfare; we are further cognisant of the assistance rendered to these pathognomonic hosts by the collaboration of septic allies which, in the guise of a mixed infection, add complexity to the strife in those corners of the field where it rages in its most acute intensity; and, in addition, we have come to recognize the advantage which accrues to the enemy when the accident of events puts him in possession of a battle-ground suited to the successful conduct of his operations.

These pioneer achievements have cleared the way for further action, and current events, backed by a flood of recent literature, bear evidence to the fact that another strategical move is at present being made in the direction of enlisting more thoroughly the assistance of public health authorities and the co-operation of the great mass of the people in renewed efforts to control tuberculosis and ultimately to limit its prevalence to sporadic dimensions. When we remember the enormous toll upon human life and productive activity which tuberculous disease in one form and another levies in almost all countries, every well-considered scheme for its abolition is worthy of the whole-hearted support of humanity at large. As in the case of other calamitous diseases endless specifics have been vaunted and advertised for its cure. Many have been mere products of the inventive faculty of the money-making and unscrupulous charlatan; others have been launched on the public, in all good faith, as the result of prolonged but incompleted scientific research; but all have, so far, failed to accomplish that decisive victory which has crowned human effort in regard to other disorders, and which, it may confidently be hoped, will in like manner some day reward the arduous labours of those who recognise tuberculosis as a powerful but conquerable enemy of man.

It is generally admitted nowadays that fresh air, sunlight, and food are the most effective weapons to be used against the tubercle bacillus, and it is further believed by many observers that these natural forces can be materially assisted by the exhibition of antiseptics, tuberculin, cod-liver oil, and other collateral aids. It has, moreover, been abundantly proved that the disciplinary methods which can be enforced in an institution, properly equipped and judiciously managed, invest them with added power to carry out their beneficent usefulness. Hence has come into being the sanatorium system of open-air management which, from modest beginnings many years ago, has now become not only a recognised plan of treatment, but one which, for the time being, has largely superseded every other curative method.

We have no fault to find with a system from which such good results have been obtained as to justify the frank acceptance of its principles as being established on grounds of unequivocal success. But it may be worth while sounding a note of warning against the risk of being carried away on the crest of a wave of ultra-enthusiasm. To many it seems likely that sanatorium treatment, though experimentally good and justifiable will not be found to prove the last word in the cure of the disease. It is asserted by such critics that sanatorium principles are being carried to excess, and that results are proclaimed by some of those who are uncompromisingly attracted by them which will not stand the test of unbiassed correction, and from which are claimed deductions that are incapable of verification. An active correspondence which has been carried on in our columns for several weeks past is illustrative of the need for an attitude of reserve.

In a volume recently issued by Dr. Arthur Latham and Mr. Charles H. Garland, under the title of *The*

Conquest of Consumption,[1] claims are set forth in favour of the sanatorium which, though representing the honest expression of the authors' belief in the system they advocate, constitute a demand upon financial enterprise and statistical reliability so formidable as to justify a policy of "wait and see" in regard to their recommendations. In this volume the authors set forth logically enough their argument in favour of the possibility of exterminating tuberculosis within a comparatively short number of years. They draw attention to the financial burden which the disease imposes upon the nation, and they estimate that it costs friendly societies over one million sterling annually in sick benefits; that 10 per cent. of the cost of the Poor Law administration—or something like one and a half millions of pounds—is due to it; that the loss of wage-earning power, because of it, is close upon two millions sterling per year; and that "the 40,000 deaths from consumption, and the 20,000 deaths from other forms of tuberculosis, which occur annually in England and Wales, represent a national loss of £26,400,000." The remedial measures suggested include the establishment of antituberculosis dispensaries, the multiplication of sanatoriums, the compulsory notification of the disease, the segregation of hopeless cases, and adequate provision for purity of the milk and butter supply. Such a comprehensive scheme would involve they say, "a capital outlay of £2,250,000, and an annual outlay of £4,580,266"; while they sum up the situation by asking "whether it is worth while to endeavour to stamp out consumption and other forms of tuberculosis by an expenditure which at the outset would amount to less than five millions a year, and which after a few years would automatically decrease." They calculate that, if their proposals were adopted, we should stamp out consumption; save an annual expenditure, direct and indirect, of between seven and eight millions of pounds; preserve about 60,000 lives per annum; and "add enormously to the national health and the wage-earning capacity of the nation."

Such specious promises of surprising results might adorn attractively the prospectus of a speculative commercial undertaking, but are they warrantable or prudent as a deliberate expression of expert experience on a scientific question concerning which opinions are still divided?

The correspondence in our columns to which we have referred throws very grave doubts on the reliability of the statistics produced by the authors, upon which they depend very largely for support to their argument.

The question of sanatorium treatment, as at present conducted, is still in the crucible of professional opinion, and there are not wanting those who entirely distrust it as a final solution of the problem.

The possibility of a specific being found for the disease is no Will-o'-the-wisp to be contemptuously brushed aside, and if medical science repeats the story of her conquest tuberculosis may, before many more decades have passed away, be as independent of sanatoriums and dispensaries and segregation camps as pneumonia or enteric fever.

In a small volume entitled *Conquering Consumption*,[2] issued contemporaneously with the book of Dr. Latham and Mr. Garland, the author—Dr. Woods Hutchinson, Professor of Clinical Medicine in the New York Polyclinic—a distinguished writer, who is well known in this country, pillories all statistics regarding tuberculosis by reminding us of the old German tradition that "Jeder Mensch ist an Ende ein Bischen tuberkulöse." He succinctly summarizes the difficulties of treatment when he says, "The bacilli do not grow of themselves in our bodies, nor are they handed down to us from our ancestors. They are always imported—carried in our food, or sucked in in the air that we breathe; whirled in the clouds of dust raised either by the wind or the deadly broom; picked up from floors or sidewalks upon our shoes, or that volunteer street-cleaner, the trailing skirt; carried by flies, or dirty fingers, or filthy garments, and dropped on our food or in our milk; shot on the floor in expectoration, there to be crawled in by the children; sprayed all overything within three or four feet in a cough or sneeze; always carried somehow—never moving of themselves—and usually by some human agency or act! Break this link in the chain and you stop consumption!"

The elaborate and prodigiously expensive machinery which Dr. Latham and Mr. Garland would have us create seems an unwieldy instrument for the severance of this one small shackle in the etiological chain of the disease. In his discursive and attractive volume Dr. Woods Hutchinson advocates, as does every physician nowadays, fresh air, sunshine, food, and regulated exercise, but he enters no plea for an elaborate and State-subsidized sanatorium system. His recommendations are essentially practical, as, for instance, when he says: "The ideal place for the cure of tuberculosis is a camp where others are taking the cure at the same time. But where this, for any reason, is out of the question, a very fair substitute, giving within 15 or 20 per cent. of the same chances of cure, can be improvised in the average home."

We have thus called special attention to the question of the treatment of tuberculosis because it is at present very much in the air. Crusades are being promoted throughout the country to teach the people the fundamental truths about consumption, and with them we are in the fullest sympathy. By instructing the working classes on the nature, behaviour, and means of propagation of tuberculous disorders, and by inculcating the value of the great natural prophylactics, more will be done to limit the prevalence of the disease in future generations than any curative measures, whatever they be, applied to those already suffering from it. We are in no sense opponents of sanatoriums; but their mission is, in our opinion, educative rather than curative, and their multiplication to any such extent as that advocated by Dr. Latham and Mr. Garland would involve, it seems to us, inexpedient expenditure in which no ratepayers would quietly acquiesce until they were more assuredly convinced than by any arguments yet before them that "the game is worth the candle."

[1] *The Conquest of Consumption: An Economic Study.* By Arthur Latham, M.D., and Charles H. Garland. London and Leipsic: T. Fisher Unwin. 1910. (Post 8vo, pp. 185. 4s. 6d.)

[2] *Conquering Consumption.* By Woods Hutchinson, A.M., M.D., Clinical Professor of Medicine, New York Polyclinic. London: Constable and Co.; Boston and New York: Houghton Mifflin Company. 1910. (Post 8vo, pp. 138; illustrations 6. 4s. 6d.)

DENTAL SURGERY.

THERE are few people, unfortunately, who can disclaim all interest in the art and science of dentistry, so without hesitation we commend to general perusal the full account of the proceedings of the Section of Odontology, which appears in the earlier part of this issue. There is matter therein of moment to all and of some attraction even to those whose knowledge of what is now a high art is limited to the feel of the business end of a burr or to acquaintance with the command

"Breathe quietly," which commonly accompanies the imposition of the nitrous oxide mask. For ourselves, we are chiefly attracted by the evidence afforded of the depth to which the scientific spirit has penetrated the dental mind. We derive this proof from the indulgence of dentists in that game which the medical profession alone among its compeers has so far shown a disposition to play. This is the sport of sitting on the end of a branch and lopping it through at the tree-end purely *pro bono publico*, and with total indifference to the effect on the sitter. The general condemnation of bridge and crown work is an instance in point. It seems that whatever the skill and patience of the operator, absolute fit of a band to a tooth is so far impossible to obtain that no mouth which includes crowned teeth is ever likely to be clean and sweet except for the briefest interval. The corollary is that bridge work and crown work—one of the most paying branches of dentistry—must be avoided whenever any alternative is possible. To other people Mr. J. G. Turner's consideration of the value of teeth in the economy of modern man may appeal more strongly. It contains both humour and common sense, and results in a conclusion that, except as aids to beauty, teeth are comparatively useless. In other words, a person who possesses no natural or artificial teeth whatever can yet enjoy and digest such food as nowadays commonly makes its appearance on the dinner table; moreover, in health and comfort he is likely to be better off than those whose teeth are bad. The rider is that, when dealing with out-patients, there should be no hesitation in removing all unsaveable decayed teeth, and every tooth if need be, merely because the person is too poor to be able to secure a well-fitting set of artificial teeth; much the same considerations apply also to children whose temporary teeth are badly decayed. We do not gather, however, that Mr. Turner, or those who approved his views, support in any wise a contention recently put forward by an American physician. It expressed a belief that artificial teeth were hardly less harmful than septic roots, and that the more perfectly they fulfilled the function of natural teeth the greater the objection to them. This view would seem to have originated in the fact that when people suddenly regain the power of easy mastication they eat food which is not good for them. No doubt this is occasionally true, but it hardly seems a reason for decrying the general use of artificial dentures. It would be different if it had ever been shown that loss of teeth was a natural sequence of a lessened need for food. But, so far from this being the case, nothing in the science of dentistry seems more certain than that dental caries and resulting loss of teeth is the outcome of purely local causes. Indeed, it now seems to be admitted that the general and only essential cause of dental caries as a rule is the use of carbohydrate food, the readiness with which particles of it find lodgement in oral crevices, and the facility with which, when thus retained, these particles give rise to the formation of lactic acid as a result of the activities of certain almost omnipresent micro-organisms. In another paper grounds are put forward for holding that the old belief that mercurials and drugs in general are bad for the teeth is ill-grounded, the administration of the mercury and the existence of ill-grown teeth being the common outcome of the same set of circumstances.

INSURANCE ON THE CHEAP.

SEVERAL communications have reached us this week from different quarters, all relating to a proposition now being made to sundry medical men by the Pearl Life Insurance Company. It is to the effect that the recipients shall agree to accept special terms for the examining and reporting on those who are candidates for policies for small sums and in virtue of monthly instead of yearly or half-yearly premiums. The fees offered for the medical reports are as follows: If the sum assured is £25 then a fee of 3s. 6d.; if over £25 but not exceeding £50 then 5s.; if over £50 but not exceeding £100 then 7s. 6d. The special temptation held out to the medical men concerned is the belief that the number of candidates for insurance will be so large that it will pay them well to do the work at these rates; furthermore, the amount of work to be done is disguised by the supply of a special form for use in connexion with these cases. We use the term "disguised" advisedly, for although, thanks to close printing and the elision of superfluous words, the whole of the examination form is represented by a single sheet of foolscap, the amount of work required of a man who fills up the report conscientiously will be precisely the same as if the questions extended over ten pages. One is disposed to believe that the authorities of this company can never have been through an examination of any sort or have gone through it blindly. Otherwise they would appreciate the fact that there is no ratio between the simplicity and brevity of the form of a question and the difficulty and labour of answering it properly. The whole of the questions asked in the document mentioned could, for instance, be got into twenty-five words, but the difficulty of dealing with them would not thereby be lessened. The words "Assess the probabilities of long life in the case of X and give your reasons in such form that their soundness can be tested," would cover everything. The Pearl Company, in short, seems to be confusing clerical labour with scientific work, and to believe that the two can be shortened by the same process. The desire of the company to place life insurance at the disposition of the poorer classes is laudable, and its businesslike wish to make a profit thereby is equally commendable; but the sympathy of the medical profession should hardly extend so far as to make it ready to assist these efforts at its own expense, and the company should be left to devise a means of putting its speculation on a sound footing in some other fashion. If, in fact, its policies became popular among the classes for whom they are intended, and applicants were numerous, there would be a correspondingly large turnover, with the usual effect of reduction of the net clerical and administrative expenditure on each item; but no such considerations hold good in the case of the medical officers who would supply the reports, and on whose judgement, ability, and simpleness the whole safety of the speculation would depend. The more candidates they had to examine, the greater the number of cases in which they would do a guinea's worth for about a sixth of that sum. If many medical men fell in with the proposition of the Pearl Company it is they who would be the initial sufferers, but in the long run the company would suffer likewise. Conscientious as we medical men as a class are, there would be an almost inevitable tendency for the value of the reports and the amount paid for them to assimilate. *Naturam expellas furcâ, tamen usque recurret.*

INFANT AND CHILD MORTALITY.

THE steady fall in the death-rate at all ages which took place in England and Wales during the second half of the nineteenth century was a great source of satisfaction to sanitary reformers, although that satisfaction was tempered with some disappointment and apprehension owing to the absence of any corresponding decrease in the rate of mortality among

young children. In 1867 Ruskin wrote that one of the crowning and most accursed sins of the society of that day was the brutality with which it suffered the neglect of children. At that time, taking the country through, of every 100 children born, 15 died before reaching the age of 12 months, and in some districts the number reached even 20 or 25. During the next five and thirty years the same high mortality-rate prevailed, notwithstanding improved sanitary conditions, increased educational facilities, and greater national prosperity. With the opening years of the present century, however, a remarkable change has taken place, and, with the single exception of 1904, there has been in each of the past eight years a steady decline in the rate of infant mortality, until in 1909 it was only 109 per 1,000 births. This gratifying result has not been achieved by accident. It has been brought about because the public generally has realized the importance of saving infant life, and at the same time public health administrators have sought for and adopted remedial measures on rational lines. Foremost among these measures must be included those which have for their object the instruction of mothers in the upbringing of their offspring, together with the giving of practical assistance where such appeared necessary. The machinery employed has included paid and voluntary women health visitors, milk dépôts, schools for mothers, and similar institutions, while much assistance has been given by such legislative enactments as the Notification of Births Act and the Midwives Act. The adoption of these preventive measures or of any one of them has not been by any means universal, and for this reason alone there was need for such a review of the subject as that contained in the report which Dr. Arthur Newsholme has presented to the Local Government Board.[1] The object of the report, as stated in the preface, has been to determine on the basis of our national statistics, whether reduction of infant mortality implies any untoward influence on the health of survivors to later years; to indicate the communities which are characterized by a continuing high rate of infant mortality and to assess, so far as may be possible, the relative value of the different factors of excessive infant mortality. The report deals in the main with the question as it affects the administrative counties and certain groups of districts within them. Next year the chief urban centres of population, especially those having the highest relative mortality, will be considered. The reply to the first question which Dr. Newsholme set himself to answer is that those counties having high infant mortalities continue in general to suffer somewhat excessively throughout the first twenty years of human life, and that those counties having low infant mortalities continue to have relatively low death-rates in the first twenty years of life, though the superiority is not so great at the later as it is at the earlier ages. As to the second question there is overwhelming statistical evidence, marshalled with a skill with which Dr. Newsholme's writings have made us familiar, that in crowded centres of population infant mortality is the highest. With regard to the factors concerned in excessive infant mortality, the conclusion arrived at is that the highest mortality is to be found in those counties where, under urban conditions of life, filthy privies are permitted, where scavenging is neglected, and where the streets and yards are to a large extent not "made up" or paved. Such circumstances have a greater influence in determining a high death-rate among young children than the industrial employment of married women or early motherhood, and the opinion is definitely expressed that there is no essential causal relation between a high birth-rate and a high rate of infant mortality. An academic discussion upon the causes and prevalence of infant mortality would serve no good purpose unless the lessons it teaches are to be put to some practical purpose. How this may be done is very clearly shown by Dr. Newsholme. He recommends more detailed investigation of all deaths occurring in infancy as a guide to administrative action; inquiries into the circumstances attending stillbirths; the adequate training of midwives; the efficient administration of the Midwives Act; the adoption of the Notification of Births Act; and the making of arrangements for the giving of instruction in infant hygiene. He does not, however, fail to point out that the chief means of securing a low infant mortality are "efficient domestic and municipal sanitation, good housing, and intelligent and painstaking mothering."

[1] Thirty-ninth Annual Report of Local Government Board. Supplement to the report of the Board's Medical Officer containing a report by the Medical Officer on Infant and Child Mortality. London: Darling and Son. Price, 1s. 3d. Cd. 5263.

BRITISH HOSPITALS ASSOCIATION.

The first annual conference of the British Hospitals Association will be held in the University Buildings, Glasgow, on September 29th and 30th, under the presidency of Mr. Cosmo Bonsor, Treasurer of Guy's Hospital. An address of welcome will be delivered on September 29th by the Hon. the Lord Provost, Mr. A. M'Innes Shaw. Among the subjects proposed for discussion are the following: "The Majority point of view on the Poor Law as regards General and Special Hospitals," to be introduced by Mr. C. S. Loch, Secretary of the Council of the London Charity Organization Society; "The Abuse of the Hospital and its Cure," to be introduced by Mr. A. Scott Finnie; "A Unified County Medical Service, and how it will affect the Voluntary Hospital," to be introduced by Mrs. Sidney Webb; "The Institutional Treatment of Tuberculosis," to be introduced by Dr. Nathan Raw, of Liverpool. The Local Honorary Secretary is Dr. D. J. Mackintosh, M.V.O., Western Infirmary, Glasgow.

DUBLIN HOSPITALS' TUBERCULOSIS COMMITTEE.

A quarterly meeting of the Dublin Hospitals' Tuberculosis Committee was held on Thursday, September 1st, at 76, Grafton Street, at 5.15 p.m. Sir John Moore was in the chair, which was subsequently occupied by Sir Arthur Chance. Among those present were: Her Excellency the Countess of Aberdeen, Sir Charles Cameron, C.B., Drs. M. F. Cox, Drury, Frank Dunne, De la Hoyde, Garland, Lieutenant-Colonel Flinn, and the Honorary Secretary, Sir William J. Thompson. During the course of the proceedings letters were read, and Dr. Joseph T. Daniel's report for the past three months was presented. He stated that during the three months ended August 20th, 1910, he had made thirty-one visits to patients at their homes, and forty-one visits were made by patients to his house, a total of seventy-two visits. The summary of the reports of the two district nurses who are working amongst the consumptive poor of Dublin and the summary of the report of the district nurse working in Terenure were also submitted and approved. A subcommittee was appointed to draw up a resolution for submission to the committee with reference to the limitations imposed on notification of tuberculosis under the present regulations under the Tuberculosis Act. The committee considered the recommendation of the Dublin Hospitals Board that lady almoners should be appointed by each of the clinical hospitals, and that

such almoners should visit the homes of the patients attending the outdoor departments, in order to make the hospital treatment more effective. It was also recommended that these almoners should give instruction and advice in matters of health, fresh air, cleanliness, dietary, care of children, and in cases of necessity efforts would be made to obtain help suitable to each case by charitable organizations or through other means. The committee, having had two and a half years' experience of the value of this system through the results to be seen in the summary of the work accomplished by their nurses for tuberculosis patients, recommended by the hospitals and others, were in a position to support most strongly the recommendations of the Dublin Hospitals Board.

ANTIVACCINATION LEAGUE DECLINING.

THE National Antivaccination League has fallen on evil days. So far as support from the general public goes a very low ebb has been reached, and there are no signs of recovery. The income of the league, as acknowledged in the official organ, has declined to such an extent that it barely reaches an average of £20 per month for the current year. In 1909 it was over £40 per month. In 1908 it was over £60 per month, and in 1907 it was over £80 per month. This is a source of much uneasiness at head quarters—a very natural state of affairs, seeing there is less money to share among those who have made the antivaccination cause a sort of profession. It is not only on the financial side that trouble exists. During recent years we have on several occasions drawn attention to the dissensions that exist among the leaders, and the bitter policy of animosity towards the medical profession which has been so much in evidence has no doubt led to many withdrawals from the ranks. Thousands of pounds have been literally wasted in the futile attempt to establish the case against vaccination, and the leaders have frankly confessed that, having regard to the "objects" of the league, their efforts have been crowned with failure. It is not surprising, therefore, that the league should be declining. Sympathy with the methods of advocacy adopted by the official organ will be still further alienated in all lovers of fair and reasonable controversy by the fact that it has been found necessary in two recent issues of the *Vaccination Inquirer* to publish an apology to members of the medical profession and withdrawal of statements and comments. In July an apology was tendered to the physicians of his late Majesty King Edward. The *Inquirer* had suggested in a previous issue that the late King's physicians were "grossly neglectful" or "grossly ignorant." In the September number an apology, withdrawal, and expression of regret was addressed to a London public vaccinator. This had reference to a suggestion that a more proper verdict at an inquest on the body of a child who had died from natural causes would have been one of manslaughter. The public vaccinator appears to have acted very generously in accepting the apology and a cheque to cover costs; otherwise the funds of the declining cause might have been seriously drained.

THE PROBLEM OF ARTIFICIAL ILLUMINATION.

DR. FORTIN[1] considers that the problem to be solved before we obtain an ideal artificial light is to synthesize daylight by artificial means. Daylight is characterized by its richness in blue rays and by its diffused light. Sunlight is diffused, as Tyndall showed, by the fine particles suspended in the atmosphere. But for their existence, the sky would probably appear black and objects illuminated by the sun would present zones alternately too brilliant or too obscure. Such a world would be very fatiguing to the eyes, which would be compelled to look at objects varying so greatly in brilliancy. Again, sunlight differs from most artificial light by its richness in blue rays of long wave length. Fortin does not agree with those who would have us believe that blue light is harmful; he says all nature is against this view. The sky is blue and the sea is blue, and nowhere are great masses of red to be found. Solar light contains ultra-violet rays, but those emitted from artificial light are largely arrested by the glass which often shields the light. Fortin even states that he had worked for long periods with the mercury vapour lamp without sustaining the least harm, and he observes that photographic workers cannot work in red light for an unlimited time. The author has succeeded in obtaining the ideal light by surrounding three Edison incandescent bulbs with a spiral mercury vapour tube. This combination is perfectly satisfactory. It is enclosed in an opal globe which mixes the light of the incandescent lamp, too rich in red rays, with that from the mercury vapour, which is rich in blue rays. The result is an almost perfect synthesis of daylight. Again, the mercury vapour lamp requires an electric resistance which is supplied by the glow lamp. We are unable to agree with the author upon the question of the harmlessness of blue light. There is not the slightest doubt that photographic process operatives who work with the uviol mercury vapour lamp suffer from severe ophthalmia electrica unless they shade their eyes with yellow glass. Excessive exposure to sunlight has also a deleterious effect upon blind individuals who are not protected by pigmented skin from the action of ultra-violet rays. This is so much the case that it is stated that blonde families tend to die out in the tropics. An oil lamp is very poor in ultra-violet rays, and is the best for use by students. Ordinary gas light contains little ultra-violet light, but the incandescent mantle emits them. The light from a carbon filament lamp contains more than that from incandescent gas, and metallic filament lamps emit still more violet rays. The arc lamp is comparatively rich in ultra-violet rays, but the uviol mercury vapour lamp has them in the greatest abundance, and is in consequence the worst possible light for the eyes. It has been installed in many factories because it does not throw a strong shadow and is very economical, using little current for the light obtained.

[1] *Recueil d'Ophtalmologie*, May, 1910.

THE COST OF PROGRESS.

IN humanitarian circles it is customary to speak of civilization as a disease, and to compare the noble savage and the effete citizen in a manner greatly to the latter's disadvantage from the point of view of health and constitution. Facts do not lend unqualified support to this kind of idealism, yet it must be confessed that the list of industrial diseases, already formidable, is a constantly growing one, and that every new invention carries attendant evils in its train. Among distinctively modern diseases may be instanced the poisoning produced by the fumes of calcium carbide or acetylene; the headache, dyspepsia, cardiac failure, and sensory disturbances traceable to the manufacture and use of aniline dyes; the frothing of the blood, known as caisson disease, which follows too rapid decompression in workers at the foundations of bridges; the functional neurosis known as telegraphists' cramp, resulting from the use of the Morse key; and the numerous affections

of the skin, lungs, digestive tract, and eyes due to irritation by organic or inorganic dusts of industrial origin. Among the last-named special mention may be made of "shoddy fever," caused by the dust arising from pulverization of wool-containing rags. A modern danger *par excellence* is that of electrocution by contact with live wires, to which innumerable workers are daily and hourly exposed. Direct currents of 700 volts pressure and upwards and alternating currents of half that amount are officially recognized as dangerous to life, but even lower charges have produced fatal results. With the sad cases of Dr. Hall-Edwards and Dr. Kassabian fresh in their minds, medical readers do not need reminding of the terrible potentialities of the Roentgen ray. The conquest of the air is proving so costly to life that there is a growing feeling that its commercial exploitation by health and pleasure resorts in the form of "flying weeks" has been altogether premature, and should for the present be stopped. If therefore we cannot admit that civilization is itself in essence pathological, neither can we deny the costliness of its benefits or the pathogenetic associations of its every forward step.

CATTLE AND SLEEPING SICKNESS.

WHEN in Uganda recently, Colonel Sir David Bruce and his fellow workers on the Sleeping Sickness Commission carried out a series of experiments to ascertain if cattle may act as a reservoir of the virus of sleeping sickness (*Trypanosoma gambiense*). Up till recently animals have not been viewed with suspicion as regards the carrying of this parasite, but now, after the work mentioned above, they will have to be. The Commission proved by experiment that cattle may act as a reservoir of the virus of sleeping sickness, and that healthy animals may be infected from them by means of *Glossina palpalis*. They also proved that cattle in the fly area do naturally harbour *Trypanosoma gambiense*, and that therefore it is possible that the cattle and antelope living in the fly area may act as reservoirs, and so keep up the infectivity of the *Glossina palpalis* for an indefinite period, but they admit that up to the present there is no definite proof that this actually does take place in nature. If later it is shown that this really does take place in natura, then the chances of stamping out sleeping sickness along an area such as the lake shore of the Victoria Nyanza will be practically *nil*, and all that will remain will be to keep the natives from living in this fly area. The loss of so much fertile land will necessarily be felt severely by a rising colony such as Uganda, but, after all, there would seem to be no alternative. The discussion on the subject will be found in the proceedings of the Section of Tropical Medicine.

INTERNAL AND EXTERNAL SECRETION IN THE HEALTHY ORGANISM IN THE LIGHT OF VITAL STAINING.

UNDER the above title Professor Goldmann, of Freiburg, has reprinted an article which appeared in the *Beiträge zur klinische Chirurgie*. By means of vital staining by subcutaneous injections of a solution of pyrrhol blue (a condensation product of tetramethyl-diaminobenzhydrol with pyrrhol) he has succeeded in demonstrating a special class of cell which is found in the connective tissues and the stroma of various organs. At the point of injection the skin of the animal becomes blue, and the coloration spreads till the whole skin is a bright blue. The aqueous humour, the bile, the milk, the faeces and the urine are all stained blue at times, and in most cases this staining of the external secretions seemed to be dependent on staining of the blood serum. The secretions might be blue when the glandular epithelium was quite unstained. Thus in the liver the gland cells were quite unstained whilst the Kupfer cells were deeply stained. The cell staining was not a necrotic phenomenon, for artificial necroses were unstained, nor was it simple imbibition from the serum, for the endothelium of the blood vessels and leucocytes were quite unstained. The cells in the connective tissue which took up the stain are identified by Goldmann with the resting *Wanderzellen* of Maximow, the klasmatocytes of Ranvier, the adventitia cells of Marchand, and the *cellules rhagriocrines* of Renaut. Throughout the monograph Goldmann refers to them simply as "pyrrhol cells." The question now is, Are these cells of any great importance; or, rather, is vital staining by means of pyrrhol blue an indication of any important function? There seems to be already very good evidence that this is the case. Thus, the choroid plexus is the only structure of the nervous system which is stained. Perhaps the most remarkable fact is that when one of the stained rats becomes pregnant the colour vanishes from the skin without there being any corresponding increase of its excretion in the urine. On *post-mortem* examination of the animals, it was found that the chorionic epithelium was very deeply stained, although the embryo was unstained. The amniotic fluid was stained. Similarly, if a tumour developed, the blue pigment migrated to the region of the tumour and was found in the surrounding connective tissues; if one ear of an animal was cauterized before the initial injection was given, it was found that the stain first appeared in the region of the burn. The observations lend support to the conclusion that the connective tissue is a huge gland with most important functions. The experiments are now being continued in pathological conditions, the results of which will be reported later.

A MONUMENT in memory of Dr. Niels Finsen, to whom we owe the light treatment of lupus and other diseases, was recently unveiled at Copenhagen.

IT is with much regret that we announce the death of Mr. John Langton, Consulting Surgeon to St. Bartholomew's Hospital, which occurred on September 11th, at the age of 70. We hope to publish an obituary notice in a later issue.

THE suite in attendance on Field-Marshal His Royal Highness the Duke of Connaught during his visit to South Africa in connexion with the opening of the first Union Parliament will include Captain E. S. Worthington, R.A.M.C., as medical officer.

MR. W. HARRISON CRIPPS, has been presented with a silver bowl, richly gilt, with caryatid handles, by the members of his surgical classes on his retirement from the appointment of senior surgeon to St. Bartholomew's Hospital.

WE regret to announce the death of Dr. Lombe Atthill, of Monkstown Castle, co. Dublin, which occurred on September 14th on the platform of Strood Railway Station, Rochester, after hurrying to catch a train. Dr. Atthill, who was born on December 3rd, 1827, retired from practice in 1898, and the recollections of his long professional life were published in the first four numbers of the BRITISH MEDICAL JOURNAL for 1910. We hope to publish an obituary notice in a subsequent issue.

England and Wales.

[*FROM OUR SPECIAL CORRESPONDENTS.*]

WEST YORKSHIRE.

REPORT OF THE BRADFORD SCHOOL MEDICAL OFFICER.

THIS exhaustive report of Dr. Lewis Williams, school medical officer to the Bradford Education Authority, for the year ending December 31st, 1909, demands more than the usual amount of notice, for various reasons. It contains numerous details of different types of school buildings, methods of inspection, and treatment at the school clinic.

It begins with the statement that education authorities are deserting the central hall type of school for the more hygienic pavilion model. Mechanical ventilation is often unsatisfactory, and natural ventilation is much preferable. Many of the schools are provided with baths, the shower bath being preferred on account of its greater cleanliness, cheapness, and applicability to several children at the same time. Swimming baths are also provided at some schools.

Methods of Inspection.

A notice is sent to the head teacher, the parent is invited to be present, and the examination is carried out in accordance with the Board of Education's schedule. The results are recorded on a health schedule, with room for further remarks after any subsequent examination. The schedules are classed as "normal" and "abnormal." The latter relate to children who need watching or require treatment; such children are re-examined again in a month's time. As soon as a child ceases to require watching the schedule is transferred to the normal bag. Each child is re-examined before leaving school. Altogether, 10,466 children were inspected in one way or another during the year; 3,542 were inspected in ordinary schools, of whom 1,533 were placed in the "abnormal" class. The number referred for actual treatment was approximately 16 per cent. of all those examined. The time spent on inspection was some five to seven minutes per child. Numerous details of the incidence of infectious diseases, of previous illnesses, of the general conditions, and of the defects and diseases found are given. Special stress is laid on the evil effects of adenoids and enlarged tonsils on children. Verminous children are excluded from the schools, the parent instructed to clean them, and, if necessary, the school nurse sees that any special method of cleansing the head is fully carried out.

Treatment.

Considerations of the various methods adopted by different authorities for the treatment of medically inspected school children follow. It does not appear that the Bradford authority has demonstrated the fulfilment of one of the requirements of the Board of Education, namely:

> To secure that only those children shall be treated in a school clinic for whose treatment adequate provision cannot otherwise be made, whether by the parents or by voluntary associations or institutions, such as hospitals, or through the agency of the Poor Law.

No inquiry is seemingly made into the financial position of the parents, a matter of the utmost importance, which, if neglected, inevitably leads to abuse. Finally, Dr. Williams enters into a lengthy dissertation on the functions and the advantages of school clinics and the objections alleged against them. In order to bolster up his arguments in favour of school clinics, he has recourse to insinuations against the capacity of the general medical practitioners of Bradford; and not of its medical practitioners only, but even of the hospitals in the neighbourhood.

Thus he quotes and evidently adopts Dr. A. H. Hogarth's statement:

> Many members of the medical profession appear quite devoid of conscientiousness. They constantly certify children as free from infectious and contagious disease and as fit to attend school when they are *obviously* suffering from ringworm or scabies, and *sometimes even in diphtheria their action is not above suspicion.* For example, out of 240 certificates of freedom from ringworm, no less than 234 were proved to be inaccurate on microscopical examination of specimens from the affected cases. . . .
>
> The school clinic has much to recommend it—its existence is amply justified by the many advantages which it possesses over *any other proposed scheme of treatment.* Having a knowledge of the conditions from the point of view of the child, the school, and the school curriculum, they (the school medical officers), are able to act *entirely in the interests* of the children, and of the authority to whom they are responsible. . . .
>
> It will probably be absolutely necessary that all children who have suffered from ringworm shall be examined by the school medical staff before they are permitted to return to school. At present children who produce a medical certificate of cure are readmitted by the head teacher. The experience of the year 1909 compels one to say that this arrangement is not at all satisfactory. Of the children so readmitted during the year about 75 per cent. were found on microscopical examination to be still affected with the disease and in an infectious condition. . . .
>
> It is useless our urging parents to obtain medical treatment and excluding their children from school, if there be no *adequate* provision for such treatment . . . the education authority can offer *adequate* provision for treatment. . . .
>
> Objection is also raised by general medical practitioners. In the past, at any rate, *they have failed in their efforts to keep the children in good health.*

The Executive Committee of the Bradford Division of the Yorkshire Branch has considered the matter, and has sent a letter of protest to the press in reference to Dr. Williams's remarks, which have been widely quoted locally. It was thought by the latter body that a *modus vivendi* had been discovered some months ago with the local education authority after an interview of its Chairman and Secretaries with Dr. Newman, of the Board of Education, and the Bradford school medical officer. Apparently Dr. Williams does not desire this, however obvious to any impartial observer is the necessity for a working agreement between the school clinic and the local practitioners. With him it is to be war *à outrance.* The medical men of Bradford, however, have nothing to fear from the contest. The answers to the reflections made in the medical officer's report are so obvious that it is really not worth while giving them here. But the suggestion made all through the report that the treatment received at the school clinic is in all its branches of the highest specialized character is too ridiculous to be discussed. The school medical officers are not only busily occupied in inspecting, but they may themselves be called general practitioners. They are treating skin diseases, infectious diseases, eye diseases, ear diseases, throat diseases, taking refractions, carrying out electrical treatment, and numerous other duties that disqualify them from giving an authoritative opinion in any one branch. How it can be expected that the general practitioners will accept the statistics and the deductions inferred from them as reliable it is difficult to understand. It is to be hoped that Dr. Williams will withdraw his statements.

The following is the letter to which reference has been made. It appeared in the *Yorkshire Observer*, *Bradford Daily Telegraph*, and the *Bradford Argus* of September 8th:

> Sir,
>
> It is to be regretted that in the recent report of Dr. Williams to the Bradford Education Committee, certain reflections on the medical profession were made which were widely quoted in the local press. The Executive Committee of the Bradford Division of the British Medical Association, as representing the medical practitioners of the city, wishes to state that while frankly admitting the beneficial effects of medical inspection of school children, and accepting the school clinic as a *fait accompli*, considers that there are grave grounds for criticism of the report referred to. Surely it must be acknowledged that for the medical inspection of school children and the efficient working of a school clinic few things are of more importance than the maintenance of good relations between the education authorities and the general practitioners. Notwithstanding this obvious necessity for amicable co-operation, the medical officer to the education authority has freely hurled all sorts of insinuations and unsustainable charges against the general body of a profession to which he has the honour to belong. These charges involve reflections not only on its professional capacity but also, and this is of far greater import, on its personal honesty and good faith. It is true that some of these charges are contained in a quotation from another source of no great authority. But no allowance can be made for this fact, for if the words are not Dr. Williams's own, they are his at any rate by adoption. That

the most careful and conscientious practitioner has his limitations and that even the medical officers of school clinics are not infallible we humbly acknowledge, but we deny *in toto* that, as the report says, "Many members of the medical profession appear quite devoid of conscientiousness," and also "They have failed in their efforts to keep the children in good health."

Having made this protest we leave the rest to the judgement of the public, who well know how much they are indebted to the zeal and public spirit of the medical profession for the enormous diminution of the death-rate and the great advancement of sanitation and hygiene of every sort in recent years, and all this long before the advent of school clinics.—We are, Sir,

Yours faithfully,

J. METCALFE,
Chairman.
J. BEATTIE DUNLOP,
J. WHERRY WILLSON,
Co-Secretaries of the Bradford Division.

MANCHESTER.

MEDICAL EXAMINATION OF ENGINE DRIVERS.

A GOOD deal of feeling has been aroused among railway men in the Manchester district by the action of the Lancashire and Yorkshire Railway Company with regard to medical certificates of fitness or unfitness for work as engine drivers. It is understood that the Board of Trade has made representations to the railway companies on the question, and has urged that the medical examination of engine drivers should be strictly enforced. On one occasion an engine driver fell dead on the footplate, and it was shown at the inquest that he had been suffering from heart disease; only recently a pointsman was found dead in his box, and other incidents of a similar nature have awakened the railway companies to the possible serious danger to passenger trains if engine drivers or other responsible servants were subject to momentary attacks of faintness or to sudden breakdowns of any kind while on duty. The men themselves and their trades unions, of course, readily admit that it is the obvious duty of the companies to see that their men are physically fit for their work, but the engine drivers of the Lancashire and Yorkshire Railway Company are finding fault with the way in which this is done. Quite recently a driver who had been in the employ of the company thirty-seven years was reduced to the position of shed sweeper, his wages being reduced from 7s. to 3s. a day, because he failed to pass a medical test carried out by the company's medical officer, though it is said that two independent doctors declared the man quite fit for duty as a driver. It is said that varicose veins, ruptures, and marks of old injuries sustained at work has been held to disqualify a driver for remaining on the footplate, and the men are claiming that such conditions ought not to prejudice a man. When a driver has been in receipt of sick pay it is acknowledged that he should produce a medical certificate of fitness before he resumes work, but it is claimed that when he has been off duty for a few days, perhaps with only a cold, he should not be required to undergo an examination at the hands of the company's doctor as strict as one for life insurance, and that the ordinary certificate of any doctor ought to be sufficient. At present any such certificate has to be submitted to the company, and in many cases the men are required to undergo another special examination by the company's doctor. The secretary of the Associated Society of Locomotive Engineers and Firemen says that in some cases the company's doctor has disagreed with the certificate of fitness given by another doctor, and the society has sent the man to a specialist, who has found that the company's doctor has made a mistake, and the man has been reinstated. In other cases, though the specialist has agreed with the diagnosis of the company's doctor, there has been nothing seriously wrong, and, as the society contends, nothing to unfit the men for engine driving. The strictness of the medical test has had the effect of preventing the men going off duty for what they consider to be slight ailments which may, after all, be serious, and they claim that they should in all cases have the right of appeal from the company's doctor. It is only fair to say that the company's view of the matter has not yet been made known, but the men evidently feel much irritation at the way in which the medical tests are carried out, and threats have been made that unless some more satisfactory arrangements are made, there may be a strike of engine drivers and firemen on the Lancashire and Yorkshire Railway.

This question of medical certificates is also assuming a serious aspect in Lancashire, not only in connexion with railway men, but in various other directions. Colliery owners are engaging their own doctors to check the certificates of the men's club doctors. Even judges, under the Compensation Act, often seem to assume as a foregone conclusion that a doctor engaged by a workman will naturally give a certificate favourable to the workman, while a doctor engaged by the masters will naturally give an opposite certificate. Within the last few weeks the Chairman of the Manchester Education Committee publicly stated that a certificate of unfitness for school could easily be got for 6d., the interpretation of this being only too evident, though it was not intended as a general imputation on the profession. Neither is it at all rare for doctors of workmen's clubs and friendly societies to have their certificates questioned, and great unpleasantness has been caused on at least three occasions in Manchester within the last two years by deliberate attempts to throw suspicion on the bona fides of medical certificates. One case occurred where a club doctor was dismissed by a small clique of members of the club because he had given a certificate that a man was fit to resume work, and the man had gone to a private doctor, paid him a fee, and obtained a certificate of unfitness for work. There will, of course, always be room for honest differences of opinion as to the exact day when a man is fit to resume work after an illness, and when there is the least doubt some slight delay in "signing off" will always be justifiable, but the matter is becoming one in which the honesty of the doctor's certificate is questioned. Attempts are made to place medical men in positions where they are given to understand that it will be to their interest to certify in a particular way, and the public are only too ready to believe that self-interest counts for more than honesty, with the result that there is a great distrust of medical certificates. It is impossible to overcome this by mere asseverations on the part of the doctor that he has honestly given an unbiassed opinion. One thing, at any rate, can be done—that is, absolutely to refuse any position, especially in connexion with clubs, where there is not a proper guarantee given that the doctor will be protected in the discharge of his duties. That is not the case in many of the clubs at present.

THE TREATMENT OF PHTHISIS IN MANCHESTER.

Some months ago a deputation of the Chorlton Board of Guardians waited on the Sanitary Committee to impress on it the urgency of further action in regard to phthisis in Manchester. It was suggested that the Sanitary Committee should provide a sanatorium for 200 patients, and the guardians held out the hope that they would assist families impoverished by phthisis. The Medical Officer of Health was instructed to report on the proposals. His report is to the effect that when voluntary notification of phthisis was adopted ten years ago in Manchester it was thought that more good could be done by giving instruction in precautions to be adopted and by securing cleanliness in the people's homes than by the erection of a sanatorium. But experience has shown that the Sanitary Committee has been greatly assisted by having accommodation to offer at the Crossley Sanatorium and at Clayton Vale. There has been a decided fall in the death-rate from phthisis, especially in those districts which have had the advantage of instruction and control. The influence of poverty in the production of phthisis and of phthisis in the production of poverty has become more and more evident. It has been calculated that the loss of wages among the notified cases in 1909 amounted to at least £48,000, and

it would be worth while to spend a large sum of money to reduce this loss. The deaths from phthisis in Manchester exceed 1 000 a year, and assuming that the cases are infective for an average of three years, there are quite 3,000 infectious cases to be dealt with of phthisis alone, apart from other infectious cases suffering from open tuberculous diseases.

At least three methods are needed to combat the mortality from phthisis: (1) Isolation in hospital. The beds at present available for this purpose number 585, including the union hospitals. But the difficulty here is that, as soon as patients get a little better, they leave the hospitals and soon become again infectious. Still there is a considerable section of the industrial classes to whom it would be a great gain to have access to hospital treatment. Many would refuse to enter a pauper institution, and while some could pay a certain part of the cost of treatment, others not only cannot pay, but cannot be induced to enter a hospital, because absence from work would reduce their families to poverty. (2) A second line of work consists in the notification of phthisis, in visiting and instructing the patients and their families, and in getting for the families such assistance from existing charities as is possible. Moreover, an effort is already made to secure some precautions in workshops, common lodging-houses, and public-houses; while in public vehicles a by-law is in force which to some extent removes sources of infection. The work done under the scheme of voluntary notification is mentioned as the most potent means of reducing phthisis in recent years. (3) The third line of work consists in giving adequate assistance to the families of consumptives. The offer of the Chorlton guardians can only apply to South Manchester, as the rest of the city is under other boards; but Dr. Niven thinks that the stigma of pauperism might attach to the scheme, and partly frustrate it, and that the magnitude of the work has hardly been realized.

It is generally agreed that unless an early diagnosis can be made there is not much prospect of cure, but several obstacles are mentioned to this early diagnosis. First of all the working men often abstain from inquiring into the causes of their illness until it is too late. Diagnosis, too, is often difficult in the very early stages, and the more penetrating methods of diagnosis, such as injection of tuberculin, are not so generally used as they ought to be. It is admitted that the German system of sickness insurance has greatly reduced the amount of phthisis in that country, though ameliorations in the general lot of the people must have had a great influence. Some fear is expressed that, if sickness insurance is adopted in England on the German system, numerous cases, which do not recover under treatment, will have to be discharged when their insurance expires, and we may still be left face to face with the present difficulties. In such cases there would be nothing for it but a judicious use of public funds. The fact seems to be overlooked that even after the personal insurance is expired in Germany, the enormous surplus funds of the insurance department are used to continue treatment as long as is necessary without resort to public funds.

Another obstacle to efficient treatment is that there is no power of compulsory detention in union hospitals, and even if there were, the probable effect would be to cause people who now enter to remain in misery at home infecting their families. Some cases, too, would have to remain in hospital for many years, which would be enormously expensive, and the utmost that could be expected from hospital treatment is some reduction of the evil. Another difficulty is the inadequacy of the staff engaged to attend to the notified cases. So far the staff has not been able to pay more than one visit to each case notified, whereas every case needs carefully following up and keeping under observation.

The following are given as among the procedures from which further progress may be expected:

1. Elementary instruction of the public as to the precautions to be used and systematic instruction to the patients themselves. Public lectures by medical men are recommended, a fee of 2 guineas being paid for each lecture by the Sanitary Committee.
2. Additional staff to deal with cases notified, which are now fairly numerous since the order of the Local Government Board came into force requiring all cases under the Poor Law to be notified to the medical officer of health.
3. More hospital and sanatorium provision. Most of the notified cases would require not less than twelve months' treatment, and for this at least 200 more beds would be needed, the cost of which would be at least £15,000 a year.
4. Compulsory notification of all cases of phthisis.
5. Accommodation for children suffering from tuberculosis, such as a combined hospital and school. A school for ailing children without definite symptoms but probably in the pre-tuberculous stage would be beneficial.
6. A system of compulsory insurance such as that adopted in Germany, but until this is established provision out of public funds should be made, for which it is estimated that about £5,000 a year would be necessary. This special provision should not be given unless strict measures are taken to see that it is properly expended in procuring good food, good clothing and sanitary conditions.

The total annual expenditure necessary to carry out these recommendations is put down at about £21,000.

SMALL-POX IN COTTON.

The occurrence of sporadic cases of small-pox from time to time among workers in cotton mills at Stockport and other places in Lancashire has led to the idea that the infection was conveyed in cotton, and in an address delivered at the International Conference on Diseases of Occupation, held at Brussels, Dr. Corbin, the Medical Officer of Health for Stockport, raised the question whether such cases might not be held to be "accidental injuries" coming under the Workmen's Compensation Act. It is recognized that the difficulty of proving the source of infection may be almost insuperable in individual cases. Nevertheless in some instances, since the possibility of cotton being the carrier of the infection was first mooted, the chain of evidence connecting cases of small-pox in Lancashire with cases occurring among the native gatherers of cotton in Egypt and the States has been followed out very completely, and every care is now taken to guard against native workers suffering from the disease having anything to do with the cotton. As Dr. Corbin points out, even if a native engaged in gathering the cotton were actually suffering from the disease, the probability of the infection being conveyed is extremely slight. In the first place, there must be considerable attenuation of the virus before the material reaches the hands of the workers in England. Moreover, there would be little chance of infection with this attenuation unless the infective material were inhaled or carried directly to the mouth. Further, persons employed in piecing only occasionally use the saliva as a means to facilitate the process, and the probability of the strands requiring to be pieced just at the point where infected material occurred is very small. In addition, the individuals must be susceptible to the disease, and this is uncommon in vaccinated persons and almost non-existent in re-vaccinated persons. Dr. Corbin's inquiries show that it is almost impossible to prevent with certainty the infection of cotton by the natives, and as one case may give rise to an epidemic, the necessity of vaccination and revaccination of all cotton workers ought to be insisted on.

BIRMINGHAM.

PROVISION FOR THE INSANE.

THE insane of Birmingham are treated at five institutions. The three chief institutions are Winson Green, Rubery Hill, and Hollymoor asylums, the last two being devoted to chronic and incurable cases. There are two smaller establishments, known as the Leveretts at Handsworth, and Glenthorn at Birches Green, which are used for private patients and as convalescent homes. The authorized accommodation in the asylums is as follows: Winson Green, 624; Rubery Hill, 817; Hollymoor, 604; the Leveretts, 40; and Glenthorn, 40; making a total of 2,125. The average resident number for last year was 1,819, or about 300 below the authorized accommodation. Of

the patients, 226 were discharged recovered, 27 were removed on the application of friends, 232 were taken to other asylums, and 163 died. There were 936 patients chargeable to the Birmingham parish, 2 to the city, 506 to Aston Union, 190 to King's Norton Union, 7 to the prison authorities, and there were 61 private patients and 108 out-city patients and contract patients. There was at one time a contract with the London County Council for the maintenance of 200 patients, but although this contract has been terminated, Birmingham still takes a large number of patients from outside authorities.

The asylum administration involves a cost to the rates of £24,000 per annum, which is equivalent to a rate of 2¼d. in the £. This amount is required to pay interest on loans and sinking fund. The institutions are self-supporting; in fact, the sums received from Poor Law authorities and private persons for the maintenance of inmates are more than sufficient to meet establishment charges, the surplus, about £2,500 a year, being carried to the building account. The capital expenditure on all the asylums amounts to £533,815. Loans have been raised to the extent of £534,257. A sum of £199,145 has been provided for redemption purposes, so that the capital expenditure remaining to be provided for is £334,670. Of the total capital expenditure, £94,720 has been spent on Winson Green, £165,012 on Rubery Hill, and £274,082 on Hollymoor Asylum. The average annual cost of maintaining the five institutions, including salaries, wages, provisions, clothing, and other necessaries and repairs to buildings, is £54,000. The annual cost of maintenance was defrayed last year by the following sums: From inside unions, £47,300; pauper lunatics outside Birmingham, £600; contract patients, £4,000; for maintenance of private patients, £3,000; and from the Treasury for criminal patients, £120.

Ireland.

[FROM OUR SPECIAL CORRESPONDENTS.]

Sutton Holiday Home and "Preventorium."

The first annual meeting of the Sutton Holiday Home was presided over last week at Sutton by the Lord Lieutenant, and was attended by a large number of the public. The object of the home is to provide fresh air, good food, and rest for persons who, although not actually suffering from organic disease, are in a debilitated state which renders them liable to be attacked by tuberculosis or other infective diseases. During this, the first year of its existence, it has received 125 patients in all, most of whom, after a short stay, were sufficiently benefited to return to active work. Amusements of all sorts are provided at the home, and a special feature is made of providing a very nourishing diet. The Lord Lieutenant, in addressing the meeting, referred to the opposition which was offered by some of the residents at Sutton to the establishment of such a home in their midst, and said that for his part he would regard such a home as likely to enhance the value of neighbouring property rather than the reverse, for instead of finding as formerly a row of empty cottages, one found cottages filled with cheerful people who were enjoying themselves in a healthy and rational way. Many will agree with the view taken by the Lord Lieutenant, but in doing so it is necessary to remember that the opposition referred to was to the establishment of a tuberculosis sanatorium, and not to the present home. As soon as the promoters of the home had given guarantees that no tuberculous patients would be admitted to it most of the opposition was withdrawn. On the question of the danger to a neighbourhood of the establishment of a tuberculosis sanatorium, opinion appears to be divided; and it is possible that strenuous opposition would still be offered by the inhabitants of seaside resorts to the utilization of their disused coastguard stations for such a purpose. Lady Aberdeen also addressed the meeting, and referred in detail to the work carried out in the home. She hoped that it would be the first of many similar institutions throughout Ireland. The starting of this "preventorium" was rendered possible by the gift of over £500 from their friends in Boston, U.S.A., but she hoped that in future sufficient subscriptions would be available in Ireland itself for its support. Sir John Moore next proposed:

> That the grateful thanks of this meeting of the Women's National Health Association be tendered to the friends of the Association in Boston who equipped and started the Holiday Home and Preventorium.

This was seconded by Sir John Lentaigne, and the proceedings terminated.

National Medical Service.

At a special council meeting of the Irish Medical Association, held on August 25th, it was resolved:

> That a sum not exceeding £200 be voted, to be used jointly with the £300 granted by the British Medical Association, for the purpose of furthering the views of the joint committee of the British Medical Association and the Irish Medical Association relative to a State medical service being formed.

Two days later the joint committee referred to in this resolution met and decided to appoint paid organizers to visit members of the profession in Ireland in order to promote united action in the furtherance of reform of the Poor Law medical service, the reform approved of by the committee itself being on the lines of the recommendations of the Viceregal Commission. A circular letter was drafted, and ordered to be sent to every medical practitioner in Ireland, with a request for an early reply. The letter summarizes the proposals that the committee favour, and at the same time assures existing dispensary officers that none of the proposals will result in any existing officer being worse off in regard to either status or emoluments. Legislation is believed to be inevitable, and possibly imminent, and it is all-important that the voice of the profession should be effective in shaping it. The proposals advocated by the committee are:

(1) That the public medical services (except lunacy) should be unified and placed under the control of a board containing a due proportion of medical men elected by the service, with laymen chosen by the county councils. (2) The establishment of a national medical service, entered by examination, and administered by this board. (3) Adequate payment to be provided for by the State, and payment to be progressive according to service. (4) Promotion to be by merit to all positions in the service. (5) The establishment of a properly organized public health service, and also of a system of hospitals accessible to all requiring treatment, and free from the workhouse taint.

Jervis Street Hospital.

The managing committee of Jervis Street Hospital in its report for 1909 states that during the year it has commenced the building of a new dispensary, for which purpose a sum of £1,000 has been placed at their disposal by the trustees of the Pembroke Irish Charities Fund. The new building has been an urgent necessity for many years. It will contain accident reception rooms, consulting rooms, a pharmacy and an emergency operation theatre. It is expected that it will be completed and ready for use at the end of next month.

Enteric Fever at Manorhamilton.

A report by Dr. Brendan M'Carthy, Local Government Board Inspector, on the occurrence of a large number of cases of enteric fever in the Manorhamilton Dispensary District, was received at the last meeting of Manorhamilton District Council. Dr. M'Carthy states that 40 cases of enteric occurred in the district during this year, and that 7 cases had occurred in the neighbouring Dromahare district since the beginning of May. During the last four or five years enteric has been endemic in the district, and the present outbreak is, he believes, caused by the use of contaminated separated milk. Dr. M'Carthy suggests that in future frequent visits should be made to creameries to ascertain whether pasteurization was being rigidly carried out, and that all water supplies at creameries should be regularly examined to guard against possible pollution.

Veterinary Dispensaries.

The first of the veterinary dispensaries organized by the Congested District Board was opened in the

Ballyhaunis district of county Mayo on September 1st, and Mr. T. J. Flynn, M.R.C.V.S., has been appointed as veterinary officer. He will attend periodically at each of the principal centres of population throughout his district to give veterinary advice to bona-fide farmers resident in congested districts, the valuation of whose holdings does not exceed £10. A regular scale of fees has been drawn up, including fees for the common veterinary operations. It is expected that many other dispensaries will be opened throughout the congested districts before the end of this month.

LEITRIM COUNTY INFIRMARY: RESIGNATION OF THE MEDICAL OFFICER.

Universal regret was expressed at a recent meeting of the committee of the Leitrim County Infirmary on the receipt of a letter from the medical officer, Dr. Bradshaw, stating that, on account of his advanced age—83 years—and failing health, he was compelled to give notice of his determination to resign his appointment as surgeon to the infirmary on October 1st. Dr. Bradshaw has occupied the post of surgeon to this infirmary for the past forty-five years, and now thanks the members of the board for their continued support. It is pleasant, he says, to look back on the fact that during his period of office he never had any cause of disagreement with the board. The chairman, in laying Dr. Bradshaw's letter before the committee, said that no man had ever done greater service for any institution than did Dr. Bradshaw for the Leitrim Infirmary, and he felt that his resignation was a great loss to the governors and to the public. Several other members also bore testimony to Dr. Bradshaw's medical skill and to his universal courtesy and kindness.

BELFAST.

The Linen Trade and the Health Department.

At the monthly meeting of the City Council the report of the Public Health Committee was under discussion. From the first the Lord Mayor ruled that they had absolutely no power to discuss "sweating"; they were bound to consider sanitation and the health of the citizens, but not whether so many buttonholes a penny was a fair rate of wages. There was further confusion, as the chairman of the Health Committee, in moving the adoption of the minutes, asked the Corporation to omit that portion dealing with the medical officer of health's report on home work. The Health Committee had met several times and examined Dr. Bailie's report, and came to the conclusion, from the explanation offered by Dr. Bailie, that "he did not intend to convey, nor does he contend, that sweating rates of payment have been or are paid in the linen and making-up trades generally"; and then the committee proposes so to alter Dr. Bailie's report as to withdraw any general charge, but to adhere to the particulars given. When the minutes were printed for the Corporation their accuracy was denied, and so all that portion dealing with this "sweating" allegation was withdrawn. The matter will come under discussion again probably at a special meeting at an early date.

Scotland.

[*FROM OUR SPECIAL CORRESPONDENTS.*]

SCOTLAND AND THE BRITISH ASSOCIATION.

THE announcement that the British Association for the Advancement of Science has received and accepted an invitation to hold its meeting in 1912 in Dundee is heartily welcomed by many who retain pleasant recollections of previous meetings in Scotland. The last time the Association met in Scotland was in 1901, at Glasgow. Altogether the Association has met eleven times in Scotland during the eighty years of its existence.

It met in Dundee once before, in 1867, and had a very successful meeting, attracting a total attendance of 2,444. The Duke of Buccleuch acted as president, and among the sectional presidents were the late Lord Kelvin and Sir Archibald Geikie, while the special lecturers included Herschel and Tyndall.

THE HEALTH OF EDINBURGH.

During the week ending August 20th the mortality in Edinburgh was equivalent to a death-rate of 12.6 per 1,000; during the week ending August 27th it was equivalent to a death-rate of 8.6 per 1,000; and during the week ending September 3rd it was equivalent to a death-rate of 8.8 per 1,000.

EDINBURGH HOSPITAL.

Their Majesties the King and Queen have been graciously pleased to become Patron and Patroness of the Royal Edinburgh Hospital for Incurables.

FEEDING NECESSITOUS SCHOOL CHILDREN IN EDINBURGH.

A committee was formed some time ago—the Flora C. Stevenson Committee—to provide dinners for necessitous school children in Edinburgh, and some interesting facts are brought out in connexion with the dietary provided. Instead of giving soup and bread for dinner the committee decided to try the experiment of giving the children porridge and milk. The committee realized that if the experiment was to be of any value superintendence was essential, and so each day a member of the committee arranged to be present when the children were at dinner.

The caterers agreed to give a bowl of porridge and milk for one penny, and an additional supply for one halfpenny to any child who asked for it. This additional supply was nearly as large as the first, but less milk was allowed.

There was difficulty at first with some children, who either had never tried or had tasted only badly-made porridge, and it was in these cases that the superintendence arranged for was specially valuable.

But as time went on all the children learned to like porridge, and an improvement was noted in their appearance. The conclusion the committee arrived at after two months' trial of the porridge dinners was that they were a great improvement on soup and bread, and justify the committee in trying them on a larger scale. School boards are empowered under Section 6 (2) of the Education (Scotland) Act of 1908 to feed some of the necessitous school children, but the task of collecting subscriptions still falls on the voluntary agencies. The porridge dinner might with very great advantage be tried in other towns, as it is a notable fact that within recent years oatmeal as a food has fallen into disuse in the homes of the working classes, and the absence of this national food from the dietary of Scottish children accounts in no small measure for the deterioration of the people.

NATIONAL ASSOCIATION FOR THE PREVENTION OF CONSUMPTION.

The President of the Local Government Board, Mr. John Burns, has intimated his acceptance of the offer of £1,000 given by an Edinburgh gentleman in the form of posters for distribution throughout the country, so as to educate the public as to the best means of, first, avoiding the risk of infection, and, secondly, recovery from the disease. This offer will be handed over to the National Association for the Prevention of Consumption.

SCOTTISH SANITARY CONGRESS.

The thirty-sixth annual congress of the Incorporated Sanitary Association of Scotland was held this year at Elgin on August 31st and September 1st. There was a large attendance of members. After the business meeting on August 31st, Dr. Templeman, Dundee, delivered a very interesting popular lecture on The Rôle of Insects in the Spread of Disease. He mentioned malaria and yellow fever as two diseases illustrative of infection by blood-sucking insects. The infection of food by the house-fly was touched upon, while the flea and domestic bed-bug were also mentioned as

insects which must be regarded with grave suspicion as carriers of infection in their rôle as blood-sucking insects. Other interesting papers were contributed by the president, who took for his address, The March of Sanitary Science. Professor Matthew Hay, Aberdeen, read a paper on Human Carriers of Typhoid and Other Zymotic Diseases. Mr. Turriff, burgh surveyor, Elgin, opened a discussion on the subject of Public Baths. Councillor Lambie, Larkhall, read a paper on The Need for Co-operation in Certain Phases of Local Government. A paper by Mr. Peter Fyfe, Chief Sanitary Inspector, Glasgow, on smoke pollution of the air, asked what should be done to prevent it. A very interesting paper was contributed by Dr. Robertson, M.O.H. for Leith, on Practical Points in the Control of Pulmonary Tuberculosis. He said that, while the problem was difficult, there was really no need for alarm. This might be gathered from a recital of one or two figures and facts which every one could understand. As far back as 1855, the death-rates from tuberculosis in Glasgow, Paisley, and Greenock were respectively 42.2, 46.9, and 49.4. In 1909 these figures had declined to 13.6, 13.3, and 11.1 per 10,000 persons living. Describing the system of treatment adopted in connexion with Leith Public Health Hospital, Dr. Robertson said that at first they tried to deal with advanced as well as early cases. They soon gave up that attempt. It was an idea which was theoretically sound, but beset with administrative difficulties. The advanced case was a heavy handful, and the nursing of such a case a dispiriting business. He was still convinced that the money spent in isolating, feeding, coddling, and nursing the hopeless cases was money wasted. Better far to employ one or more nurses to visit and revisit such unfortunates than, literally speaking, throw away the ratepayers' money. Any necessary education could be done at home. It was a great mistake to inflate these unfortunate persons' minds with the idea that they were to be bolstered up at the hospital and fitted for a sphere of comparative utility. He knew that there were many who were not at one with him. That did not unteach what he had learned by practical experience. The very fact that they were, figuratively speaking, shutting the door of the hospital in the face of the advanced case was already bearing fruit. The method he advocated for dealing with the advanced cases might seem harsh. It was theoretically not correct, he granted, but the plan was fashioned to fit the frame of administrative practice. One did not run public health on sentiment. From the very outset they had followed the principle of housing the patients in unpretentious shelters. These shelters Dr. Robertson described. The treatment of consumption did one thing pre-eminently. It taught people that they could live in draughts. It was the fear of draughts that killed many people, because they preferred to breathe and re-breathe the poisonous exhalations of one another rather than admit the simple antidote—fresh air.

Mr. John Lindsay, Depute Town Clerk, Glasgow, dealt with the question of combination of authorities in the enforcement of the provisions of the Public Health Act of 1897. Provisions which were permissive and optional had their weakness, and what was required was that the Local Government Board should have the right to say to any two or more local authorities that they should combine for the more efficient carrying out of the requirements of the Act. Separate action on a small scale cost more to the ratepayers and tended to reduce efficiency. Such combination was at present allowed by the Act, and in the matter of inspection of meat and food (Section 43) combination would secure uniformity of inspection. Section 46 of the Act dealt with disinfection and destruction of bed and body clothing, and enacted that every local authority might, and if required by the Local Government Board "shall," make the necessary provision. But the power of the Board should also be extended to the subsections which stated that two or more authorities *may* combine to make such provision. When Parliament gave the Board power to compel combination under Section 66 in the provision of hospitals, reception houses, and nurses for infectious disease, it should also have given similar power to compel combination for prevention of such disease when that result would probably be attained by reasonable co-operation. Provisions for sewerage disposal, water supply, epidemics, etc., were also referred to in detail, and, in conclusion, Mr. Lindsay said that what he had urged as regards combination of local authorities, with the Local Government Board behind to compel such combination in those cases in which they thought fit, referred mainly to contiguous local authorities, whose population was not very large or whose district was not very great. The principle, however, also applied, in his view, to the cases of smaller local authorities whose territory was contiguous to that of a larger local authority. In such a case the larger authority had usually the best and most modern and extensive equipment for defending the public health, and there could be no question that the public interest demanded imperatively that the adjoining authority should fall into line with its more powerful and progressive neighbour. The work and enterprises he was referring to were such that it was idle to talk of the smaller authority attempting to overtake them for the benefit of their individual ratepayers. Parliament and the Local Government Board had recognized this in many cases. Two outstanding instances that had occurred in his official experience were: first, the city of Glasgow in its undertaking for the purification of the Clyde; and, secondly, the constitution of the Corporation of Glasgow as the Port Sanitary Authority of the port of Glasgow. In both cases the executive authority was the Corporation, although the scope of the respective operations extended beyond the city's municipal territory. The contention he was now urging was in the first instance confirmed by Parliament, and in the second by the Local Government Board, and that after the fullest inquiry and consideration in each case. What undoubtedly was required in this country was that in any question involving the protection or the maintenance of public health Parliament should, through such a public department as the Local Government Board, have the general oversight and supervision of the work of local authorities, so as, on the one hand, to prevent either the shirking of duty to save expense, or the overlapping of work and the consequent waste of public money; and, on the other hand, to secure the best possible results without extravagance for the general body of the people.

The Congress closed with a paper by Mr. Alexander Fraser, Inverness, on Social Problems in Relation to Public Health, in which he advocated a State control of parentage. He would make it a preliminary to the formation of a home that a man should prove his ability to maintain himself and his family before he was permitted to incur any responsibilities. He might be told that this would immediately result in the decrease of births, but that would be balanced by the decrease in the deaths of infants; and, in any event, would this be a loss, in view of the quality of the children? A remedy could be found in no more severe or difficult a form than the so-called labour colony. There the inefficient might remain all his life, earning his living and prevented from doing harm to the present generation or passing on his bad character to any descendants of the next.

REPORT OF LUNACY COMMISSIONERS.

In the forty-sixth annual report of the General Board of Commissioners in Lunacy for Scotland it was pointed out that for the first time for nineteen years there was a fall in 1903 in the number of pauper patients in establishments in proportion to population. The results of the retrospect submitted in the fifty-second annual report, issued on September 9th in a Blue Book, are regarded therein as showing that the year 1903 marked a true turning point, and that no permanent increase in the amount of registered insanity is likely to occur in future under present conditions, beyond the almost inevitable rise due to increase of population, or such

as might result from mere accumulation through a diminished rate of discharge.

On January 1st, 1910, exclusive of insane persons maintained at home by their natural guardians, there were in Scotland 18,337 insane persons of whom the Board had official cognizance, including the inmates of training schools for imbecile children and of the criminal lunatic department of Perth Prison. Of these, 2,560 were maintained from private sources, 15,724 by parochial rates, and 53 at the expense of the State. As the total number on January 1st, 1909, was 18,197, an increase had taken place during the past year of 140. No less than 2,843 lunatics were boarded-out in private dwellings on January 1st, 1910.

During last year 496 private patients were admitted, being 114 less than in the preceding year, and 73 less than the average for the quinquenniad 1900–4. The number of pauper patients admitted was 2,753, being 160 less than the number during the preceding year, and 255 below the average for the quinquenniad 1900–4; 91 voluntary patients were admitted into asylums during 1909. The average number of such patients admitted for the ten years 1900-9 was 91. The number resident on January 1st, 1910, was 99.

Two hundred and fifteen private patients were discharged recovered during 1909, which is 19 less than in the preceding year, and 37 below the average for the five years 1900–4. The number of pauper patients discharged recovered was 1,030, which is 151 below the number for the preceding year, and 261 less than the average for the five years 1900–4.

The number of patients discharged unrecovered was 149, or 1 less than last year, and 21 above the average of the five years 1900–4. The number of pauper patients discharged unrecovered was 369, which is 47 below the number so discharged in the preceding year, and 44 less than the average for the five years 1900–4.

The number of private patients who died in establishments during 1909 was 209, which is 38 more than in 1908, and 41 more than the average of the five years 1900–4. The number of pauper patients who died was 1,184, which is 43 more than in 1908, and 170 above the average of the five years 1900–4.

Escapes.

The whole number of escapes during 1909 was 145. Of these, 68 were brought back within twenty-four hours, 44 within a week, and 11 after a week. There were 22 still absent on the expiry of twenty-eight days from the date of escape. Of the 22 patients not brought back, 5 were removed from the asylum registers as recovered, 5 as relieved, 9 as not improved, and 3 died.

Accidents.

During the year 1909 there were 117 accidents, of which 10 ended fatally, 7 being certainly or probably due to suicidal intention.

The present condition of establishments for the insane occupies more than seventeen pages of the report. State and criminal lunatics and lunatics in private dwellings are reported on. The number of private lunatics who were provided for in private dwellings, with the sanction of the Board, on January 1st, 1910, was 120. The want of accommodation for the poorer class of private patients is again referred to, and it is stated that permissive power should be given by statute to district lunacy boards to provide accommodation for private patients under certain conditions. Legislation in the direction suggested would tend to relieve the rates and would meet with the approval of district lunacy boards. The total cost per patient for all district asylums in Scotland for 1908–9 was £44 17s.

Asylums Officers' Superannuation.

The Asylums Officers' Superannuation Act, which was passed at the close of last year, and which came into operation in Scotland on May 15th of the present year, provides for the superannuation of all established officers and servants of district asylums upon a contributory basis, which, in the case of those in service when the Act passed, varies according to length of service from 2 to 3 per cent. of salary or wages and emoluments, and is 3 per cent. in the case of all those appointed subsequently to the Act coming into force. Unless in the case of those permanently incapacitated from duty after ten years' service, the Act requires a service of twenty years before pension can be claimed.

Quinquennial Retrospect.

The figures relating to registered insanity during the past five years fully confirms the hopeful prognostications made in 1903 and 1906. Increases occurred, in excess of what could be accounted for by increased population, varying, in the quinquenniads between 1881 and 1905, from 18 to 20. In the last five years this increased proportion dropped to 7. But for the fact that the preceding quinquenniad contained two of the years (1903 and 1904), in which a diminished rate of increase first manifested itself, the fall in the last period would have been more marked. The proportions of registered patients per 100,000 of population for each of the past five years are as follows:

1906	363
1907	362
1908	365
1909	366
1910	364

If it could be shown that the rate of production of registered insanity is standing still or diminishing, though the fact may not at once express itself in the number shown on the register at a particular date, the result must be that the number on the register will sooner or later be brought into correspondence with the rate of production.

The conclusions brought out by a retrospect of the last quinquennial period may be stated as follows:

1. That the number of patients on the register has increased during the past five years, but that the increase is greatly below that shown by any quinquenniad during the previous twenty five years.
2. That the occurrence of insanity as shown by admissions to the register in proportion to population shows a marked decrease throughout the past five years.
3 That this decrease is confined to no particular part of the country, but is manifest throughout the country and irrespective of whether the population of a district is rising or falling.
4. That the number of patients removed from the register by discharge as recovered or unrecovered has been falling continuously during the past thirty years, and never to so large an extent as during the past five years.
5. That the removals from the register by death have risen to some extent, especially during the past ten years.
6. That the increased number of patients found on the register during the past five years is due solely to accumulation caused by a continuous fall in the number of patients discharged, to an extent which outbalanced the effects of a lowered admission rate and a higher death-rate.

Boarding Out.

In his fifteenth annual report relative to private and curable patients as well as insane poor persons resident in private dwellings, Dr. J. F. Sutherland makes some interesting remarks. It was found that the available accommodation in Inverness District Asylum was all but utilized, and steps were taken to board out in the colonies near Inverness chronic, harmless, and incurable patients, either on probation or by minute of the Parish Council. It was pointed out to the parish officials that, to begin with at all events, it was preferable to adopt the hitherto successful plan of providing for them near Inverness. If they were removed to a distant place, the cost of removal from and return to the asylum in the event of the patient from any cause proving unfit for family care would outweigh the saving resulting from the lower cost of maintenance, while, if boarded out within a radius of twelve miles of the District Asylum, they could, at little cost, be promptly returned to the District Asylum in the event of proving unfit.

The activity in evidence at the Inverness District Asylum in recent years in the matter of boarding out unrecovered cases finds expression in the following suggestive figures—for 1907, 24; for 1908, 34; and for

1909, 50. The steps taken by Dr. T. C. Mackenzie, the medical superintendent, have most effectively relieved the congestion of the institution and thus averted the need for extension. It will not, it is presumed, be seriously doubted that a similar policy periodically pursued in all other institutions would obviate for many years to come the need for costly asylum extensions to meet the overcrowding due to the undesirable accumulation of patients who have ceased to need asylum care. For the success of the policy here adopted what is necessary is hearty co-operation and conference between the medical superintendent, the inspector of poor of the parish in which the colonies are situated (for it is he, with his special knowledge, who has most to do with finding suitable homes and guardians), inspectors of poor of near or remote parishes to which patients are chargeable, and the Visiting Commissioners as representing the General Board. Co-operation of the kind referred to can alone bring about what is best for every interest concerned. Within a radius of sixteen miles of the Inverness District Asylum, 132 patients (51 males and 81 females) were to be found in private dwellings and specially licensed houses. Of these, 38, for the most part in the town of Inverness, were residing with related, and 82 with unrelated guardians, and of the whole, 87, or 66 per cent., had at one time or another been inmates of the asylum. The Inverness rural colonies, it will be acknowledged, thus fulfil a most useful purpose in connexion with boarding out. The average weekly allowance in the area is about 5s. 6d. exclusive of clothing and boots, which would bring the cost up to something like 6s. 6d. per week, a sum less than that which prevails in the South and Midlands by 1s. 6d. per week. The great majority of the patients in the districts of Abriachan, Caiplich, and Glen-Urquhart are housed with crofters, whose rents range from £1 to £42, the average rent of the houses and holdings being about £12. Many of these houses may rightly be said to afford cosy and comfortable quarters. The acreage of land attached to these houses ranges from 1 to 60 acres, and the average may be put at 20 acres. The capacity of the 132 patients for usefulness either in the home or in the fields may be expressed as follows: "Useful," 47; "moderately useful," 43; and "useless," 42.

Glasgow Royal Infirmary Post-graduate Courses.

The opening lecture in connexion with the post-graduate courses at the Glasgow Royal Infirmary was delivered by Sir James Barr, M.D., LL.D., Liverpool, his subject being The Use and Abuse of the Lime Salts in Health and Disease. Mr. J. D. Hedderwich, Chairman of Governors, presided, and referred to the fact that Sir James was a former student and resident surgeon at the Royal Infirmary. He also commented on the post-graduate teaching which had regularly been given at the infirmary, teaching which attracted men from all parts of Scotland, and occasionally also from Australia, Canada, Africa, and even China.

The Western Infirmary, Glasgow.

The managers of the Western Infirmary last week appointed Dr. Barclay Ness a visiting physician and Dr. Robert Kennedy a visiting surgeon, to fill up the vacancies left by the death of Sir Thomas McCall Anderson and the resignation of Sir Hector Cameron. Though the new Royal Infirmary scheme is not yet in working order it is so far advanced that the University Court agreed to allow the managers of the Western Infirmary to anticipate events and to assume the patronage of the wards formerly allotted to the clinical chairs. Under the deed of constitution of the old clinical chairs the Western Infirmary was bound to provide ward accommodation for the two professors, and, consequently, the patronage was not directly in the managers' hands. Under the Royal Infirmary scheme the clinical chairs at the Western Infirmary are abolished and the endowments are transferred to the former. Consequently the managers resume full control of the appointment of the staff.

Special Correspondence.

PARIS.

Antityphoid Vaccine.

On June 21st last Professor Vincent communicated to the Académie de Médecine the result of his work on antityphoid vaccination. The subject of typhoid fever shows no signs of disappearing from the notice papers of medical meetings. Tuberculosis itself, which a few years ago was the chief topic of discussion, seems now to have given place to typhoid as the main subject of interest to scientific men. No doubt it is natural enough that our microbiologists should from time to time feel the want of a change of organism. Be this as it may, antityphoid vaccination would seem to have entered upon the practical stage. Of the three ways of obtaining prophylactic vaccine —injection of living bacilli of attenuated virulence, injection of dead bacilli, and the injection of bacillary autolysins —M. Vincent only made use of the last, holding that the use of living bacilli gave rise to disappointment. The diminution in their virulence is never more than relative, and they may even sometimes, in subjects particularly susceptible to infection, give rise to the very disease which they are meant to ward off. It is always a dangerous game to try and make wolves into watch-dogs. Vaccines made from dead bacilli do not give rise to regrettable surprises of this kind, but if effective they may nevertheless sometimes cause very troublesome reactions, both local and general. Our tissues submit with a very bad grace to being turned into cemeteries. Macerations of the products of the living Eberth bacilli alone produce a vaccine which is both useful and harmless. M. Vincent uses a composite extract made from eight kinds of typhoid bacilli. After making numerous experiments *in anima vili*, he tried this vaccine on thirteen persons who nobly offered themselves in the cause of humanity; he gave four to ten injections in ten days, and the subjects experienced neither pain nor fever. In spite of the apprehension which the unlucky number might have aroused, the immunization of the thirteen subjects was achieved. To establish this M. Vincent did not inoculate them with typhoid fever—an experiment which a man would only be justified in performing on himself. But he withdrew some serum from the subjects treated, and introduced into it highly virulent bacilli, which in that medium did not take long to fade away and wither as if they had been attacked by galloping consumption. The blood diluted with 500 to 1,000 times its volume of distilled water did not seem to suit them any better. He considered it reasonable to conclude from this immunization *in vitro* that these persons had really been rendered immune. But no analogy equals actual demonstration by a fact. As with the vaccine of Jenner, so in this case success in an immense number of cases will be necessary before the value of the discovery can be accepted as proved. The preparatory work of Vincent justifies us in extending the experiment to everyday practice, and in appealing without undue temerity to the verdict of the future. When the duration of the immunity thus produced shall have been determined, it will be possible to put antityphoid vaccination on a footing as methodical and systematic as vaccination against small-pox. Meanwhile, let us not neglect hygiene and disinfection, and let us hope that there will survive throughout the world only so many tame typhoid bacilli as will be sufficient for the production of Vincent's vaccine and Chantemesse's serum. We should then be able to dispense with them altogether and return to the heroic ages when the heart projected into the arteries only blood without any admixture. Yet I feel rather uneasy when I think that our descendants will have to undergo many repeated vaccinations against tuberculosis, typhoid fever, cancer, small-pox, the different kinds of eruptive fevers, and an endless number of acute diseases. In my prophetic soul I foresee the time when, as a consequence of the prevalence of strange disorders, unexpected neuroses and previously unknown infections, the following question will be put to the International Academy of Pantopolis: Can the humours be adulterated with impunity?

The immunities effected by Nature in the course of centuries have been brought about by the slow adaptation

of the organism to the environment. Is not the nature of artificial immunizations by their very abruptness sufficient to upset the balance of life? In the present state of things it would be as rash to assert this as to deny it. Let us remember that down to the present time we have only treated individuals; in fact, we have done even less—we have treated lesions or symptoms only. How little we know about our slow physiological evolution, about the obscure problems of heredity, and about functional transformations! We accept the common opinion that diseases change, that some disappear, that new ones appear. But how can we state this definitely in the terms of the old-fashioned nomenclature, so uncertain and so badly drawn up? We can quite understand that tuberculosis would have depopulated the world if it had prevailed in the Middle Ages with the same virulence as if the contagion had had full scope in the horrible hygienic conditions of ancient times, where the neglect of personal cleanliness, unhealthiness of dwellings, the narrowness and uncleanliness of the public streets, the horrible promiscuity of the latrines, poverty, famine, and war, combined to render human ignorance the prey of every infection.

In truth, the virulence of the germs of diseases has become attenuated and that of others increased, and in our strife with evil our efforts to assist Nature are often rather blind. There is just one thing which may help us to believe that our efforts are not altogether wasted, and that is the lightheartedness with which we regard remote results. However presumptuous our science may be it does not rule the world, but is a part of it; developed by the human mind, it is one of the forces by which it is nerved and changed. It is one of the agents of its evolution, as Darwin saw it in the mechanism of animal life. It is enough for us to seek to bring ourselves into tune with the harmony of the universe.

BUDAPEST.

Ehrlich's New Antisyphilitic Remedy in Hungary.

THE extraordinary interest which was aroused by the first announcement concerning Ehrlich's new antisyphilitic remedy which appeared in the papers resulted in such a rush of patients to the doctors asking for its administration that many practitioners were induced to go to Frankfort to study the new method at the source. I was amongst those who went to Frankfort and to Berlin to learn the details of the method, and the readers of the JOURNAL may be interested in reading my experiences and those of other Hungarian doctors as they were described in *Gyògyàszal* (Therapeutics) of June 26th and July 3rd.

The famous meeting of the Berlin Medical Society of June 22nd, when Professor Wechselmann first exhibited the syphilitic patients who had been cured by the Ehrlich-Hata diamido-arseno-benzol marks a new epoch in the therapeutics of syphilis. Clinical experience has doubtless sanctioned the belief that mercury is a certain cure for syphilis, though we know very little of its mode of action. Does it kill the spirochaetes? For some time this was thought to be the case. But, if we consider what a small amount of mercury enters into the organism in a regularly-applied mercury cure, we tend more and more to the belief that mercury does not directly act as a germicide, but rather as a catalyzing agent, thus affecting the healing power of the tissues. This view is confirmed by the fact that even after the administration of an excessive dose of mercury, which may even be dangerous owing to its haemolytic action, we do not see more rapid or permanent cures in organisms infected with syphilis.

It has been said that practical experience has confirmed our confidence in mercury. Yet how often are we deceived in this belief! Tertiary manifestations and the so-called post-syphilitic diseases of the brain and spinal cord must be attributed to the insufficiencies of a course of mercurial treatment. Ehrlich's greatest merit lies in the fact that he has made an exhaustive series of experiments with a drug which, it was known, could produce a damaging effect on the spirochaete. That drug is arsenic. With this substance he experimented till he was successful in finding a combination which, when tried on animals, proved to be efficacious with mathematical certainty. This he recommended as a remedy for human beings, and from the cases cured in Berlin and reported by Wechselmann, and by Spatz in Budapest, it would seem that Ehrlich's remedy has a future. Some days after the Berlin meeting I myself saw the cases exhibited there, and I can say without exaggeration that in some of them the effect of the remedy was quicker and more pronounced than I have ever seen produced by any other therapeutic method.

This statement must be taken to refer to *some* cases only, because the so-called secondary symptoms of syphilis have often been known to disappear after a single injection of a mercurial solution. But that the progress of malignant syphilis should be checked at once, that feverish cachectic individuals should apparently be cured after the administration of a single injection, that they should gain in vigour and in body weight, that ulcerations of many years' standing should be healed at once—this, indeed, is marvellous. To see such a patient three days before and three days after an injection strikes one with astonishment. After what I have seen in Berlin and in Budapest (in the 17th Military Garrison Hospital), I do not hesitate to say that even if later it should turn out that our hopes regarding the new remedy were exaggerated, the simple fact that the remedy is capable of producing such a rapid and wonderful change in the most severe cases of syphilis, which till now have proved refractory to treatment, renders it invaluable. Its quick action is its most surprising quality. In illustration may be quoted a case of Dr. Sellei in which the diamido-arseno-benzol was injected into a woman suffering from syphilitic roseola. Five hours after the injection the syphilides had become pale pigmented spots. Twenty-four hours after the injection preparations made from the affected skin showed no spirochaetes even on the most careful microscopical examination, whereas before the injection it swarmed with spirochaetes. Dr. Sellei has been authorized by Dr. Wechselmann, Professor of Dermatology and Director of the Dermatological Department of the Virchow Hospital in Berlin, and by Dr. Spatz, Senior Dermatologist to the Garrison Hospital in Budapest, to report some of their cases which have been exhibited before the Berlin Medical Society and before the Budapest Medical Society respectively.

Abstracts of a few cases related in the paper published in the *Gyògyàszal* may be given here:

1. Woman with lichen syphiliticus. It is generally admitted that lichen has reacted very slightly to antisyphilitic remedies hitherto in use, and that it is one of the severest forms of syphilitic infection; twelve days after the injection the exanthemata had entirely disappeared.

2. A male patient with similar exanthemata; complete resolution took place four days after injection. Four days later the lichen had totally disappeared, only dark brown patches marked the site of the eruptions.

3. Female patient with anal stricture due to syphilis. Ulcerations in the anus. Large serpiginous syphilides on both buttocks. She had frequently been treated with mercury injections, inunctions, etc. On May 5th she was given an injection of Ehrlich's remedy. On May 27th all the ulcers, even those in the anus, had healed.

4. A male patient suffering from papular syphilis. Five days after the injection no trace of the exanthemata remained; only pigmented spots were visible.

5. A female patient with papular syphilides. Entire healing five days after injection.

6. Plaques on the tonsils and large ulcers on the soft palate. Twelve days after injection, complete cure.

7. Papular syphilis. Six days after injection the exanthemata had almost entirely disappeared.

8 and 9. Severe cases of malignant syphilis. In both cases every recognized remedy had failed. The Ehrlich treatment has done wonders. One patient is completely cured; in the other a very small ulcer still persists.

10 and 11. Cases of pemphigus neonatorum. Both entirely cured.

12, 13, and 14. Cases of pemphigus syphiliticus neonatorum. Although all died, the skin symptoms disappeared after the injection.

Dr. Wechselmann also related some failures with the Ehrlich remedy. One case was that of a female patient with broad condylomata on the labia majora and around the anus. After injection of arseno-benzol the condylomata

round the anus diminished; those of the vulva, however, still persisted.

A male patient with sclerosis was given an injection on June 7th. The sclerosis was in process of involution, but still existed on July 6th.

These few cases show that Ehrlich's drug acts quickly in the different stages and manifestations of syphilis. Of course all cases do not react uniformly to the drug. The most surprising feature is that severe cases, and cases which do not react to mercury, quickly and surely respond to the new method.

Very interesting and instructive, too, are the animal experiments. Ehrlich first studied the action of his drug on hares. He inoculated the testes of hares with material containing spirochaetes, and when the primary syphilitic symptoms made their appearance he began to treat the animal with amido-arseno-benzol. In his Frankfort laboratory he showed me photographs of animals with syphilitic diseases in different stages of regression. In his animal experiments his principal assistant was Hata, a Japanese doctor. The spirochaetes were not demonstrable sometimes even twenty-four hours after injection. This shows that the amido-arseno benzol exerts a powerful germicidal action on the spirochaetes, and therefore is really specific.

Of course, the short time the new method has been in use does not allow a definite conclusion to be drawn as to the permanency of its effect. Is it capable of preventing a recrudescence? does it really kill all the germs at once? Alt, Schreiber, and others maintain that though, in a few cases, a formerly positive Wassermann's reaction has become after a single injection negative, this is not a conclusive proof that this result will be permanent. Whether recurrence will take place after the symptoms have seemingly abated is a question to which time alone can supply an answer. This fact, notwithstanding all the hopes excited by the effects of the remedy, should make us very cautious in forming a judgement. The injection, though not dangerous, must be very carefully administered, because, according to Ehrlich, if we do not satisfy ourselves beforehand of the soundness of the patient's retina and optic nerve, we may meet with serious by-effects, though it is unquestionable that the amido-benzol is far less toxic to the optic nerve than atoxyl. Ehrlich does not use his remedy in the case of patients suffering from heart disease, aneurysm, liver and kidney disease, or phthisis. It is also contraindicated in the case of infants and aged weakly subjects. Doctors who get his medicine for experimental purposes—already (July 15th) there is none left in stock—are required to sign a written agreement to the effect that they will not employ the remedy unless the patient remains in bed for the specified time and that they will carefully observe the cases and send reports thereon to Ehrlich.

As regards its chemical composition, the drug is dichlorhydral-dioxy-diamido-arseno-benzol. It is a greenish-yellow fluid put up in small vacuum tubes. The technique of the injections has been elaborated by Alt and Wechselmann. The latter has stated the proper doses and made it possible to employ the drug without inflicting considerable pain on the patient. The powder, of which Wechselmann gives 0.60 gram for one injection, must be dissolved in a little methylated spirit, whilst sufficient normal caustic solution is added to made the solution turbid. Whilst the caustic is being added the mixture must be stirred with a glass rod, otherwise it becomes jelly-like and unsuitable for injection. Then to the fluid some drops of phenolphthalein are added. This indicates whether the fluid is rendered sufficiently alkaline or not. Normally only enough phenolphthalein is added to make the solution slightly red.

The injections are best given high up into the glutaei. The skin is first painted with tincture of iodine; then the fluid is slowly injected. The original method of administration gave rise to fever and pain, but with the modifications introduced by Wechselmann these disagreeable effects are prevented.

AN ambulatory chair for the teaching of the measures necessary for the prevention of malaria has been founded at Adria by the Visconti Institute of Modrone. It is intended that the professor shall give lectures and demonstrations in the rural districts of the Basilicata and Apalia.

Correspondence.

SICKNESS AND INVALIDITY ASSURANCE.

SIR,—Professor Moore's ideal of a unified State medical service, in which all posts, from that of a district medical officer in the country to that of physician to a metropolitan hospital, would be open to all by examination, has long been my ideal, and the effect of its institution on the efficiency of the profession individually and collectively would, I believe, be enormous; but with this ideal service I am not concerned in these letters to the JOURNAL, and although my arguments as to possible financial loss in the transition stage would still be applicable, I for one would be willing to suffer loss in order to become part of such an ideal service.

But there is no evidence, as far as I know, that the Government has in view any such sweeping reform of the medical profession. Mr. Lloyd George's Sickness and Invalidity Insurance Bill, great and courageous move as it is, is a bill to ameliorate the lot of the poorer classes, the results to the medical profession being secondary; and if we are to judge by the attitude of Governments in the past towards us, our services may be sought at the lowest possible rates. My argument, therefore, is concerned with such a State medical service as may be called upon to serve the working of Mr. Lloyd George's bill.

That there exists in the profession to-day a feeling of insecurity is indubitable, and I share it. If I felt myself in the happy position of security from danger as that in which Professor Moore is, my letter to the JOURNAL of August 20th would not have been written, and I might have been adducing the same arguments as Professor Moore does in taking notice of my modest letter, and in the same spirit of detachment and complacent serenity. Professor Moore says, in effect, that the matter is very simple, that even in the transition stage no one can lose. But is it so simple as his somewhat academic arguments would lead one to suppose? Let Professor Moore suppose, for the moment, that he is a medical man in a town where there are twenty or thirty other medical men, and that he has a practice worth £1,500 a year, in which he has invested £3,000; let him suppose, further, that one-half of this income is derived from the classes the care of which would be taken over by a State medical officer. When the State medical service is instituted Professor Moore would have the option of accepting an appointment in the service. By refusing he would lose £750 annual income, so naturally he accepts, and doubtless all goes well. But perhaps in three or four years' time he may wish a change of climate, or, being still young and ambitious, may wish to take up special work, or for various other reasons may be desirous of leaving this town. What then is his position? He can sell the half of his practice which is derived from private patients and realize £1,500 of the original £3,000 of his capital, but where is the other £1,500 to come from? He cannot sell his State appointment. Will the Government give him the equivalent of this £1,500 after three or four years' service, or will it study his wishes and give him an equally good post in another town more to his liking, or will it allow him to devote himself to special work, at the same time paying him the interest on his £1,500, till it gives him another appointment; or, finally, will it make him feel that he is in servitude, and that, after all, unless he resigns himself to losing his £1,500 he had better be content to remain where he is till he reaches the age of 65 and can claim this pension which Professor Moore tells us he would get, and which is to serve as the equivalent of his invested capital?

Is there any authoritative information available which will enable Professor Moore to answer these questions satisfactorily?

If I act on Professor Moore's advice, and appeal to friends in naval and military medical services, am I told that these premier services are models of organization and pervaded by a spirit of contentment? Not a bit of it.

Is there the least likelihood of an entirely lay Government like the present, unassisted and uncontrolled by our own profession, giving us a State medical service which will satisfy us? The time for this has not yet come; I wish it had. If a bill for this purpose were being framed by Professor Moore the matter would be on a

different footing. My conclusion, therefore, is that we shall be serving our interests best by opposing any scheme of State medical service which, in the light of our present knowledge, is likely to be put before us for the working of Mr. Lloyd George's bill.—I am, etc.,

Burnham, Somerset, Aug. 30th. BRUCE C. KELLY.

SIR,—A suggestion by a late correspondent of yours—namely, of placing the medical side of this important business before the Chancellor—is a good and sound one.

I wrote at once to our member, requesting him to lay before the Chancellor the desirability of requesting a conference, in due time, with the British Medical Association, in order to facilitate amicable relations once and for all with the profession in this matter, and the careful avoidance of approaching them through the medium of friendly societies.

I enclose the answer received; it is as follows:

Upcott, Barnstaple, N. Devon,
August 28th, 1910.

My dear Sir,

I shall have very much pleasure in placing your letter before the Chancellor of the Exchequer, who will, no doubt, give it, and the suggestion contained in it, his serious consideration.—Yours faithfully,

ERNEST J. SOARES.

How many of the 40,000 odd medicals are moving in the matter ere it is too late?—I am, etc.,

Hartland, Aug. 31st. A. L. MARTYN.

SIR,—A few weeks ago I saw in the BRITISH MEDICAL JOURNAL that Mr. Sidney Webb had been invited to speak—in fact, to be the principal speaker—at a meeting of the British Medical Association. In the course of his speech-making, which was ill-chosen and decidedly impertinent considering the audience he had, he, in reply to a question by Dr. Fothergill regarding the disposal of certain "possible recovered money," made the astounding reply that he did not care what was done with it, but that it might be put to a fund for necessitous medical men out of employment. He also condescended to congratulate the medical profession on being such poor fighters for their own interests. And well he might!

I should like to know who was responsible for a man so evidently out of all sympathy with the general body of the medical profession being asked to address such a meeting, and I should like to ask also why the meeting did not pass a motion expressing entire disagreement with Mr. Sidney Webb's efforts. Would such a man be taken into the counsels of the Law Society and be allowed unchallenged to give vent to such ill-mannered utterances?

I notice that Mrs. Sidney Webb, who describes herself as a member of "the National Committee for the Prevention of Destitution," is also trying her best, apparently with the help and connivance of "the leaders" of our profession, to pauperize us. Will you please explain why valuable space is granted, in the issue of September 3rd, to her letter on "The New Midwives Bill," in which she has the hardihood to ask the medical profession to oppose the bill on behalf of "thousands of thrifty and hard-working women and their families"?

Mrs. Sidney Webb has apparently a great deal to learn. Every medical man unfortunately could tell of confinements, too numerous to recall, where he has attended entirely free of charge, and where the poor unfortunate families could well afford to pay, but prefer to spend their money on drink, gramophones, visits to the seaside, fancy food, silk dresses and blouses, gaudy hats, theatres and music halls, and a thousand other things—in fact, on everything but paying their doctor's bill.

The really necessitous cases do not require Mrs. Sidney Webb's advocacy, nor that of the ambitious and falsely styled "National Committee," with its backing of clerics intensely jealous of the advance of science—especially medical and surgical—and the confidence which the public now reposes in it.

If there is to be State aid for sickness and invalidity—which I very much doubt, and which I, for one, shall strenuously oppose if contrary to the interests of the profession—why should the legal profession not be put on a similar basis, and, indeed, all trades and professions? In other words, why should we not all be converted to socialism?

I do not deny that there are many hard cases requiring help. No one knows that better than a man in general practice. But what I do say is that the problem should be tackled in a different way. The root of the whole business is the *wages question*. Some workers have far too much and others far too little. Why should medical men be victimized to keep the victims of sweated labour in a semblance of health while their oppressors, their employers—in so many cases alien Jews by birth—are left quietly in possession of their ill-gotten booty?

It would also be a great boon to the community at large if stern restrictions were placed upon the insertion of quack advertisements in newspapers, and of advertisements of articles for sale on the instalment plan. These two avenues of spending money—which, moreover, brings no commensurate return—are patronized very largely by the uneducated, and require drastic attention.

Lastly, may I urge that the medical profession does not require outside assistance, no matter from what exalted quarter? In my opinion, it wants fair play, and it wants better representation to get it.—I am, etc.,

Liverpool, Sept. 7th. ANDREW SERGEANT MCNEIL.

SIR,—Just as in national and imperial politics affairs are rapidly nearing perhaps the most serious crisis that this country has ever seen, so in medical politics we shall before long be face to face with the most momentous question that can possibly be put to our profession. Are we to continue to live the life of independent individuals, free in thought and speech, for the most part *sans peur et sans reproche*; or, on the other hand, are we to be allowed to exist, tongue-tied servants of a Government department, obsequious flunkeys of a tyrant State? Are we to live on our own terms or on State terms? Are we to be free or slaves?

Although our very liberty depends upon our answer to this imminent question, we are to-day in such a humiliating position, owing to our own cowardice, selfishness, and apathy, that it can be answered in only one way. We can only say, We have no organization, no unity, no power of combination, so we must perforce throw ourselves on the generosity of the State; we must trust to the sense of justice in the party leaders. The generosity and the justice of the Coroners Act, the Early Notification of Births Act, and the Vaccination Act! God help us! Governments will not, and we ourselves cannot! Hard words: cowardice, selfishness, apathy? Yes, and hard facts! Rank cowardice to fear the shadow while hugging the substance; to shriek at the *name* of trades unionism while using its severest methods.

Our apathy is horrible. How many Branches get a 10 per cent. attendance when a medico-political subject is down for discussion? But selfishness is the greatest curse of all. We begin by asking how much we can give a man if he will join the Association, what wonder if he on his part asks how much he can get out of it? We shall not even begin to move until every member, and every would-be member is continually asking, "What can I do for the Association and for my profession?" Working in such selfish spirit do we deserve any better fate than the one which will surely overtake us—obliteration as a great, a noble and an independent profession?

Is there no *man*, no *leader of men*, amongst us to sound the clarion notes—altruism, loyalty, courage, swift action, and unbending pride in our calling? And if these notes spell trades unionism? let us boldly avow the fact, and no longer shamefacedly pretend that we are too *gentlemanly* to be trades unionists.

We are tiring of schemes, reports, amendments, riders, and such like, and we wearily ask *cui bono?* What position are we in that we can dictate terms of any kind whatever to our masters?

At the present time we care not so much what the profession thinks as whether the whole profession will stand shoulder to shoulder in backing up the studied and expressed opinion of the majority.

We are fighting for great principles, justice and liberty, aye, and for much more, even for life itself, and at such a time I warmly endorse Dr. Grey's opinion that the details of schemes, and even the schemes themselves, are no

business of ours, but that it is our business to see to it that we are in such a position that we are able to either accept or reject these schemes, according as they seem to us just or unjust.—I am, etc.,

Bristol, Sept. 6th. H. F. DEVIS.

SIR,—Dr. Grey is quite right in demanding payment for work done and in desiring the complete abolition of contract work.

Some years ago I was practising alone in a town of 3,000 inhabitants and refused to take a local club over on contract rates, but accepted on the condition that a fee be paid for each consultation, and I won the day.

My experience is that club patients are never off the doorstep, but those who pay, like the National Deposit Friendly Society, are never on the doorstep.—I am, etc.,

Harrogate, Sept. 4th. J. W. MALIM.

SIR,—It has been suggested to me that the opposition to the proposal that the State should deal with individual medical men on the basis of payment for each attendance arises from a fear that it might open the way to fraud in "running up bills" unnecessarily. That such a suspicion should be entertained shows a lamentable ignorance of the part which the profession has played in the prevention of sickness, and a blindness to facts that is almost culpable. Our attitude towards such mental myopia might well be one of profound contempt and indignation, but it may be more expedient to reason gently with the offenders, and, having expressed our opinion than a bond is unnecessary, yet give that bond as a proof of good faith. Since, therefore, it seems that a "scheme" of payment per visit at ordinary fees might tangibly allay the fears of dishonest dealings, and make clear to our ministers what is already clear to us, it may be well to foreshadow how the matter might conveniently be dealt with. I might, however, point out that overpay of medical men might not be such a disaster as our legislators seem to imagine, and would be considerably better for the country and the nation than underpay. It is notorious that medicine as a commercial business is a failure. When one considers the capital sunk in a medical man's education and in starting or buying a practice (more than enough to launch him in a large business), and the arduous and responsible labour of practice, the long hours (ten or twelve a day in a six and a half or seven day week), and the fact that the doctor's income depends solely on his own personal labour, it seems probable that there will be before long a marked deterioration of the class who will enter medicine as a profession. Moreover, it is unquestionable that in the present day the wretched pay, necessitating the taking on of more work than the doctor is capable of doing well, is responsible for the actual low standard of medical services, a standard far beneath that which the progress of medicine and facilities for education have put within our reach.

I have already pointed out that it is the State's business to find the money for medical attendance and the other benefits they propose to confer on the industrial classes, and to calculate how much they want; but as some ideas on this point also appear to be expected from the profession, I may refer the Chancellor to a letter of mine in the JOURNAL of 1903, vol. ii, p. 615, where I calculated, from the figures of one of the sickness insurance companies, that the average doctor's account on ordinarily healthy lives might be taken as £2 4s. 1d. per annum, this to include the cost of collection under a sickness insurance scheme. Other figures may be obtained from friendly societies and so on, and with due allowance for the classes of patients dealt with, and for the economy that might be effected by a Government department dealing with large numbers, might be collated to find the incidence of sickness. The cost of medical attendance will undoubtedly be found to be very much greater than the penny-a-week club would have led one to suppose; but this is the very reason that the medical profession must refuse to accept any more contract work, since contract work has always meant an acceptance of risk at a totally inadequate premium, and its strong point in the eyes of its promoters is the opportunity of putting that unwarrantable risk on the shoulders of the promoters' servants.

It is presumed from the Chancellor's statement in the House that, to furnish the necessary sum, employers, employees, and the Imperial Exchequer will all contribute, and I suggest to Mr. Lloyd George that he should tax the employees per family and not per unit; it stands to reason that the more medical attendance a labourer needs (according to the number of his family or his own health) the less will he be able to pay for it, and to levy an extra contribution from a delicate man or a quiverful man is to ensure that he or his children must be less well clothed and fed and housed, and *ipsa causa*, more liable to sickness. I am sure, also, that the suggestion to levy on bachelors the same as on married men will commend itself to the Chancellor as a check on that distressful condition yclept the decline in the birth-rate. The sum, then, to be taken per family might be calculated *pro rata* of wages; and, as the benefits to be received for it—medical attendance, sick pay, out-of-work benefit, and old age and debility pensions—are enormous, the contribution exacted may well be a large one, even to 5s. in the £; the more so, since, according to John Stuart Mill, whatever sum the labourer is forced to spend on comforts he has not hitherto had, he will not do without those he is accustomed to, and will demand and surely obtain a rise of wages sufficient to keep up his "standard of comfort." Many labourers also, especially those least able to afford it, pay as much as this in house rent alone for the doubtful benefit of roof-shelter in a slum.

Having, therefore, obtained the employees' contribution, the Chancellor must consider carefully the capacity of the employer to contribute, and I hope everyone will agree that this is really a point we need not be expected to investigate. I cannot see how it enters into medical politics. It is said that the State must also bear part of the expense. Whether this is so or not is again a question of political, not medical, economy. All the medical profession can say about it is that if the funds drawn from the employers and employees are insufficient, the balance must *not* come out of the pockets of the medical men who serve the State in this matter.

Now as to the "scheme" of payments.

The important point is that the relation of doctor and patient is to be the same as in private practice; the patient to have free choice of a doctor, the doctor to be paid his ordinary fees.

The ordinary fees for visits, surgery attendances, and medicines, for fracture cases and confinements, are as easy to ascertain in any district as the price of bread or meat. The ordinary fee is neither the lowest a doctor charges to his poorest patient nor the highest he demands of his richest (since the higher fee is taken to make up for the loss on the lower one), nor yet the fee of the "cheapest" medical man nor of the "dearest"; but is the fee charged to the majority of patients and by the majority of doctors, and any medical man could say at once what is the ordinary fee in his district; there ought to be no difficulty about this, but I enlarge on it because there has been considerable talk of the difficulty of fixing a fee. The only difficult fee to fix would be the confinement fee, which is universally ridiculously inadequate; the seven or eight *post-partum* visits usually given, charged as ordinary visits at 3s. each, come to 21s. or 24s.; and a confinement fee of 21s. means that the attendance at the birth, often many hours in the night, is a free gift, and charity or advertisement.

The Payment of Accounts.—It is almost inevitable, I think, that in the State insurance scheme the workman's contributions will be deducted from his wages by his employer, and I suggest that the workman will obtain the service of the doctor through his employer by a system of sick-notes, as is done by a large firm in this town.

When the employee or any of his family is sick, he will apply to his firm for a sick-note on Dr. Brown, Dr. White, or Dr. Grey; this note to be valid for attendance during a month, a fortnight, or a week.

(The sick-notes of the Bristol Dispensary and of the private firm referred to are valid for six weeks, but I suggest that they may vary according to the man's statement as to what is likely to be required.)

This sick-note is taken to the man's doctor, who forthwith commences attendance. (In emergencies the man summons the doctor first and then obtains a note.) The doctor fills in each visit and attendance on the back of the note (as easy a matter as keeping a day-book and ledger), and at the end of the week, fortnight, or month, returns it to the employer, keeping himself a counterfoil of the total

amount. The employer endorses the account and sends it to the official paymaster. If the attendance is not finished the patient obtains another note, which is dealt with in the same manner.

There are thus already two checks on the attendance. First, the repeated applying for a note and stating generally the nature of the service required—for example, the man says one of his children has got diarrhoea, and obtains a sick-note for a week; at the end of a week he asks for another note for a month as his child is certified as having typhoid. Secondly, there is the check of the employer knowing his men, who are the shirkers, who are the sickly ones, and who have the sickly families; often also he knows the nature of the illness, as in accidents at the works.

There is still a third and doubly efficient check, for the note goes to the official paymaster, who ought to be a medical man like the medical officer of health. In a very few weeks *any* paymaster would have a very intimate knowledge not only of the amount of attendance each disease or accident averaged, but of the amount given by each doctor in his district for any particular ailment. In case of a difference of opinion between the doctor and the paymaster, the matter could be referred to the Ethical Committee of the British Medical Association local Division, who would deal equitably and honourably between the two. When it is remembered that not only are there the criminal laws and courts of justice available for the prevention of fraud, but that the medical man is also subject in such cases to the crushing penal powers of the General Medical Council, it will be evident, I hope, that the idea of fraud in "running up bills" is, as I said, contemptible.

The "ordinary fees" may be a stumbling-block to some doctors, who would say "my fees are higher than the ordinary ones, and I cannot accept the fee of the Government paymaster." But this practitioner has already the same difficulty in his ordinary practice, and if some of his patients who used to pay him 5s. a visit are now insured by the State (as under the payment per visit system there is no reason why they should not be) to the extent of 3s. a visit, he will as easily obtain the supplementary 2s. as he did formerly the 5s. in competition with his *confrères* of lower requirements.

This system also solves all difficulty about wage limits. In a letter to the JOURNAL of February 19th, 1910, Dr. P. R. Cooper says:

> What a blessing it would be if all medical practice could be paid for in this way—that, is, not by the patient but by an independent insurance department—

poor persons being assisted in their premiums by the State. Now there is nothing in this scheme to prevent the man with an income of £500 a year (to whom insurance against doctors' fees is as necessary as insurance against fire) insuring with the State by paying a premium equal to the total contributions of State, employer, and beneficiary, and there might even be two scales of premium to meet the benefits required, or the *pro rata* on income premiums might be continued up to £1,000 a year. In a letter to the JOURNAL (May 7th, 1910) Dr. Gough says:

> The extension of the present club system as suggested by the British Medical Association is about the worst system for the average general practitioner that could be devised . . . the principle of the thing is wrong; if any "scheme" is to be carried through, it must be unanimously supported by the whole body of our profession. To obtain such unanimity of purpose it is a *sine quâ non* that the scheme shall not be detrimental to the interests of any section of the profession.

Now the British Medical Association's scheme, and Dr. Fothergill's scheme, are both detrimental to the interests of that section of the profession—namely, the general practioners—which is affected by them, though I agree with Dr. Gough that the former is the worse offender; but a scheme which aims at putting our poor patients on the same footing as our rich can be detrimental only to those club doctors who hold their patients by *force majeure*. Certainly their occupation will be gone; but this scheme, if it does anything at all, will redress the present inequality between the amount of attendance required and the amount actually afforded by the patients' means. It is true in one sense that at present there are too many doctors, but only too many for the pay available, not too many for the work that ought to be done. Under a State insurance scheme, with adequate remuneration, there will be work *and* pay for all, at least for many years until the supply of doctors once more exceeds the increased demand, and the doctor with all club patients, even if he loses two-thirds of them as a result of their freedom, will earn as much as he did before from his club attendance. Lastly, the club system has been a righteous grievance to the club *patient*, and, as a club doctor myself, I feel it would be a low ground to take that I might lose my club patients in dealing with that grievance.

My scheme, therefore, is to approach the Government with these propositions:

1. The vast majority of medical men work primarily for love of their work, and not for pay (proofs galore in Poor Law Commission Report, in attitude of science, history of medicine, etc.).
2. Poor pay of medical men is bad for the patients they treat, for the progress of medicine, and therefore for the nation at large. (Enlarge on club work—100 patients a day—the "bottle of medicine," impossibility of, not unwillingness to do, good work, and so on.)
3. The payment per head system is obnoxious to all medical men (except such as hold only clubs, which is equivalent to being a salaried officer).
4. Private practice or whole-time salary are the only services which *wholly* satisfy the doctor (or, we might add, the patient).
5. Salaried officers are barred for a State insurance scheme, because the *subscribers* will demand and have a right to unlimited choice of doctor.
6. It is better for the patient and for the nation that they should get medical advice too easily rather than with too much difficulty.

We present to the Chancellor of the Exchequer (7) a scheme for leaving to the contributing assured full liberty to have what doctor he will, and for paying that doctor in the way he would like by a system of sick-notes or vouchers (this to be discussed and elaborated if necessary).

And if the answer to that scheme is that it would cost a great deal of money, we reply that the gain to the nation in health, physique, and freedom from anxiety will be greater even than the gain to the doctor in being emancipated from the atrocious conditions under which he has laboured so long; and I cannot but think that a statesman of the first rank would view the magnitude of the benefits he had the chance to confer, with a mind broad enough to see the smallness of the merits of parsimony in the methods of achieving his project; nor could I suppose him blind to the honour that would devolve on the man who discarded the idol of "cheapness" in favour of equity and efficiency.—I am, etc.,

Bristol, Sept. 3rd. HARRY GREY, M.D.

SHIP SURGEONS.

SIR,—The accompanying letter is typical of many received by me. I must thank the numerous ship surgeons who have written in similar terms supporting the scheme of association as outlined in the letter of June 9th. It may be remarked that one of the suggestions contained therein has since been acted upon—namely, "the revision of the existing Board of Trade scale of drugs and appliances"—surgeons of several leading companies having been called upon to report on the question of the present drug supply.

Dear Dr. Elliott,—As an old ship surgeon of the Orient, Royal Mail, Union Castle, Pacific Steam Navigation Company, and other lines, I need hardly say I am in complete sympathy with the formation of some organized society, partly represented by a subcommittee of the Medico-Political Committee of the British Medical Association, to inquire into the many rightful grievances of ship surgeons. As a fairly large body of professional men earning their livelihood at sea, the utter apathy displayed by them in this matter is much to be deplored, and, I fear, only tends to accentuate the bad name the ship surgeon has in many cases deservedly earned.

If we mean to establish our proper status it is essential that, as ship surgeons, we unite firmly, and form a strong representative committee, which will ultimately secure not only the aid of the British Medical Association and the Board of Trade, *but of all shipping companies*. We will then have some chance of improving not only the lot of the ship surgeon, but ensuring that shipping companies have steady, capable, and reliable men, who will not in future be looked upon as the "birds of passage" they have hitherto been.

The many points detailed in your letter all need consideration. The formation of a Royal Naval Reserve of Surgeons is

what many would heartily welcome, and should prove a stimulus in fostering the much-needed *esprit de corps*.

If necessary, make use of my name, for I shall be glad to help in any way I can.—Yours very truly,

(Signed) GEORGE A. F. GRAVES.

The tone of the above letter is similar to many received daily, all going to show that the time is ripe for reform.—I am, etc.,

Rostrevor, Sept. 9th. JOHN F. ELLIOTT.

SIR,—I have read with much interest the somewhat desultory correspondence which has been appearing under the heading "Ship Surgeons" for the last two months. I am greatly afraid that interest in this matter is difficult to arouse, principally because those who should be most interested in it are generally at sea, and are out of touch with current medical news.

About two years ago an attempt was made to start a ship surgeons' association. On writing fifteen months ago for particulars, I was informed that the proposed association had failed to materialize owing to lack of interest. I am not a member of the British Medical Association, but if a maritime branch could be formed, or something definitely done for ship surgeons, I should certainly become a member.

With regard to the work, there seems to be a general idea that a ship surgeon has next to nothing to do, and that he is a "slacker," if not something worse. This may be true on some routes, but on others the work is very heavy at times. Things are quite busy enough for most men on the homeward run of a mail ship from Bombay to Marseilles, with a fever-infected crew and a full list of passengers—women, children, and debilitated men—to look after, to say nothing of inspections of every member of the crew every day from Bombay to Suez.

It would be interesting, I think, if some one who has been surgeon on one of the big Atlantic liners would give a brief outline of the work done on a single trip—say, on the Cunardar *Mauretania* or the White Star *Baltic*.—I am, etc,

September 8th. DUKTER-SAHIB.

NOTIFICATION OF BIRTHS ACT.

SIR,—Owing to certain cases which have been placed in my hands, it is clear that in some districts in England the local authorities intend to bring into operation the penal clause of the Notification of Births Act in respect of "medical attendants" who have failed to carry out the procedure of notification. It will be remembered that where the Act is in operation the duty of notification falls upon the parent, the person attending, and the medical practitioner. Apparently, the penal clause for non-notification is to be set in motion against the last of these only; and in one case it will fall to the lot of the Medical Defence Union shortly to defend seven or eight summonses issued against an individual member. We have, as lately reported in the JOURNAL, successfully defended a member who was proceeded against, being able to plead as a defence that he had reasonable grounds for belief that one of the other "parties" had notified. I should like to warn the profession generally that if this defence be raised, it must be supported by evidence.

A medical practitioner, as soon as the birth is complete, should call the attention of the father of the child or the nurse attending to the necessity of notification, and if possible this direction should be in the presence of a third person, so that additional evidence should be capable of being brought forward if a summons be issued against him later. Whilst the Act is in operation it is useless to ignore it or to imagine that the authorities are not prepared to prosecute. A rude awakening will soon assure practitioners to the contrary. The procedure adopted by most authorities is to treat the parent and the nurse as non-existent, and to deal with the medical attendant as if he were the sole person responsible for the notification. This procedure is manifestly unjust, but the loose drafting of the Act, like so many other Acts, presses heavily upon our profession, and permits this choice of defendants to the authorities, and enables these to single out the "doctor" for the attack.

There are two alternatives to escape the penalty of conviction or the trouble of a prosecution: either to duly notify, or to see that one or other of the persons named in the Act carries out the directions as to notification. It must be always remembered that in defending we have to satisfy the magistrates that we had reasonable ground of belief that someone else has notified, and that unless we can do so a penalty may follow.

The Notification of Births Act is going to cost the medical profession some considerable trouble, and every precaution should be taken to prevent additional loss of money by incurring penalties. Almost every session of Parliament now casts additional unpaid work upon our profession. The proposed "Coroners Act," promoted by a medical member of Parliament, and, I believe, drafted by a "medical barrister," will be, if passed, another instance of the manner in which the profession is to be heavily burdened for the benefit of the public, without remuneration. It is high time that united action should be taken to check this legislative exploitation; to refrain from defending ourselves because a cry may be raised that we are "out for fees" is to brand ourselves as cowardly. Is there any other profession which is compelled by law to do so much gratuitous work as ours? It is high time that we prevented any further "raid upon our hen-roosts."—I am, etc.,

London, W.C., Sept 6th. A. G. BATEMAN.

CORONERS' LAW AND DEATH CERTIFICATION BILL.

SIR,—I was glad to see the four excellent letters on this subject in the BRITISH MEDICAL JOURNAL of September 3rd, and hope practical steps will at once be taken to give effect to Dr. Mussellwhite's suggestions. (These should include non-members of the British Medical Association.)

As long as the members of the medical profession allow themselves to be treated as convicts—that is, forced to work for nothing—just so long will they be treated in this way. If they, as a body, decline to do professional work for the State without reasonable remuneration, that remuneration will be forthcoming, and with it the respect of all reasonable and business men, and the work will be well done and be of value to the State.—I am, etc.,

Ambleside, Sept. 5th. G. AINSLIE JOHNSTON.

SIR,—We, as a profession, claim that we should be paid for work done by us, and it appears that in consequence of this attitude on our part we have rendered ourselves liable to the reproach that we are "out for fees." We are no more "out for fees" than are all men and women who have to support themselves by their own exertions and are not living on independent means.

Dr. Asten tells us that Sir William Collins has omitted arrangements for payment in his bill for reasons of "diplomacy." It is strange that men in other occupations are never refused payment for similar reasons. If we order provisions from our butcher or baker, we have to pay coin of the realm, and the diplomat who obtains goods from tradesmen without payment very soon gets into trouble. May we hope that "diplomacy" may soon become as obsolete inside the House of Commons as it is outside it?

The suggestion made by "Unitas" in your issue of August 13th that we should cross out the words "I have examined the body" is open to the objection that the registrar might decline to accept a certificate so treated, with the result that the relatives of the deceased might be unable to get the body buried. Most of us would give way if matters came to such an extreme as this.—I am, etc.,

September 6th. DEMOCRAT.

SANATORIUM TREATMENT OF TUBERCULOSIS.

SIR,—Dr. Dutton's letters in the JOURNAL of August 13th and 27th make it quite clear that, in his opinion, cold, damp night air is hurtful to the individual, and apparently his opinion is shared by a writer in last week's issue. It is this groundless fear of the injurious influence of cold, damp night air which compels a large number of people to close tightly their bedroom windows at night and spend their sleeping hours in badly-ventilated rooms, much to their own detriment. Some nine years ago at our county hospital we built an open-air balcony capable of containing ten beds. On this balcony have been treated cases of pulmonary tuberculosis and a large number of other diseases likely to be benefited by the open air

Since that date, so satisfied have we been with the results of our balcony experience, that we have added open-air balconies to every ward in the hospital, including the two children's wards, so that every night, winter and summer, we have on an average over forty individuals—men, women, and children—sleeping in the open air. The night air of our city is, as a rule, neither warm nor dry, and yet I feel sure that every member of our hospital staff is thoroughly convinced, as the result of observation, that our patients derive very great benefit from this form of treatment. We, of course, take care that our patients are sufficiently warmly clothed and protected from rain and snow. When we started our balconies we anticipated some trouble in overcoming the rooted objection of many to night exposure, but our anticipation proved unwarranted. After the first night patients settle down, and they very, very rarely indeed want to return to the shelter of the ward. Over and over again patients have told me that they sleep so much better in the open and wake up more refreshed; there can be no doubt, too, that their appetites are much improved by the constant inhalation of cold pure air.

Dr. Dutton tells us that animals and birds seem to have a deep-rooted instinct to avoid cold, damp air, especially night air. It would be interesting to know how in this country birds and beasts manage to avoid breathing the cold, damp night air. Certainly the birds in the Thames valley seem to thrive wonderfully on it. Naturally in stormy weather they seek as much shelter as they can, but that does not prevent their breathing the night air.

I feel sure that if only Dr. Dutton had the opportunity of closely watching the treatment of a considerable number of patients suffering from a variety of diseases in open-air balconies, his long-cherished prejudice against cold, damp air would be overcome.—I am, etc.,

Oxford, Sept. 5th. W. COLLIER.

SIR,—I have read with considerable perplexity in the JOURNAL of August 27th Professor Pearson's criticisms upon our Westmorland Sanatorium statistics, based upon his perusal of three annual reports which I had sent to him, thinking that they might possibly be of some use to him in the special work upon which he is engaged. My perplexity arose from finding that he had based his criticisms upon the assumption that our statistics deal with *all the patients* admitted into our sanatorium—that is, out-county as well as Westmorland patients (which together number over 900 up to the end of last year), whereas I expressly stated in both my letters to the JOURNAL that our statistics were confined to Westmorland, and the same fact is clearly stated in the reports sent to Professor Pearson. Hence he makes it appear that there is annually the omission of a startling number of patients, the percentage of unrecorded cases advancing by leaps and bounds during the last few years! Certainly this is so, if the *total patients* be taken into account, and why? Simply because the Westmorland cases, which we record, have remained almost stationary in numbers since the commencement of our work (16 to 20 beds), whilst the number of out-county cases, which we do not record, has increased rapidly, especially during the last three years, until at the present time they occupy upwards of 40 beds. The mistake has arisen through Professor Pearson having taken his figures from a short table in the medical superintendent's portion of the tenth annual report, which gives the *total number of cases* admitted each year since 1900. If he has done this inadvertently, it seems a strange mistake, considering that in the same report (tenth) there is a clear statement of our method of recording cases to be found on page 3, under the heading of "results." If purposely done, I can only suppose that he declines to deal with statistics of Westmorland patients as a separate group, whilst we continue to admit a large number of patients from other counties, whose after-history is not followed up. In the absence of any explanation as to why he has thus dealt with our figures, I fear that the general impression produced by his letter upon the mind of the ordinary reader will be a very misleading one, and this, I feel sure, is the last thing Professor Pearson would desire.

Secondly, with regard to the change of description from "moderate" to "severe" in Class B cases, the transition may sound rather abrupt, but it in no way affects the results, the same patients being found in that class, whatever be the description. We retained the term "moderate" (that is, "moderately advanced") as long as we classified a third group, C, as "advanced"; but when we excluded the latter, three years ago, the word "moderate" for Class B cases was changed to "severe," in accordance with Dr. Turban's classification, where this term is applied to cases similar in character to those of our Class B.

Thirdly, Professor Pearson draws attention to some discrepancies to be found in the three reports sent to him regarding the number of A and B cases recorded over a series of years, and especially to the disappearance of some 18 cases in the 1910 report. It is quite true that in a few instances there has been a transfer of patients from one class to another. It was only done after a careful revision of the original reports in the case-books, and with an earnest desire to give the most correct classification, and never with the idea of improving the appearance of our reports. The most important cause, however, of the disappearance of some of the patients in the 1910 report is that in former years we included cases from the contiguous district of North Lonsdale (often coupled with Westmorland, but really a part of Lancashire), whereas last year we decided to exclude them as not strictly belonging to Westmorland. The after-history of these cases shows that their retention would really have improved our statistics. Had I known that Professor Pearson intended to give a critical analysis of these reports in the JOURNAL, I could have furnished him with detailed information upon all these points. What I have here said, however, will entirely account for any discrepancies alluded to by him, though it would be quite impossible in a letter of this kind to go into all the figures necessary to prove this.

I can readily see that our tabulated statements, as they stand, with the alterations alluded to, may minimize their value for the purposes of the trained statistician, but it must be remembered that they are chiefly for the use of the general public in this county, and in the form in which they appear in the last report I again claim that they give an absolutely complete and accurate record of all Westmorland consumptives (Classes A and B) treated during the last ten years. It may be statistically unsound to omit the very advanced cases, as Professor Pearson tells us, but being practically incurable under any treatment, I still fail to see how their exclusion affects the position which I took up in my first letter to the JOURNAL, which was an inquiry into the relative merits of sanatorium treatment and that of former days among those consumptives in whom there is some prospect of arresting the disease. Apologizing for the length of this letter, in which I trust I have stated the matter clearly and, above all, fairly,—I am, etc.,

Kirkby Lonsdale, Sept. 3rd. WM. S. PAGET-TOMLINSON.

P.S.—Pressure of work prevented this reply appearing in the JOURNAL of September 3rd.

A PLEA FOR CONSUMPTIVES.

SIR,—While much is being said and written with a view to checking consumption, social laws have been made and legislation even suggested to make it a notifiable disease, it may not be inopportune to hear the views of one of the accursed. I use a strong term with some reason, for I have recently found that servants refuse your service, hotel keepers refuse to keep you, lodging houses object to having you, one's own home and people are anxious to get rid of you, so that I, for one, feel justified in considering myself "one of the accursed." And the result of all this energy of philanthropists, of societies, and of medical men has opened up a new field for commercial enterprise, and the "accursed one" is advised or forced, as the case may be, to go to a sanatorium. I happen to have been in one, and can say with conviction that the curative power of sanatoriums is absolutely imaginary.

No one denies that good air and good food are not only beneficial but absolutely necessary to "cure"; but to the leisured class who can afford both in their own homes the superiority of the latter as a place for "cure" is immense. I speak of the ordinary case of the consumptive, not of him who is also a drunkard or drug addicted—and for these cases I admit the possible desirability of sanatoriums. But surely a life surrounded by disease, by

those on whom death has already laid his hand, by racking coughs and expectorating sounds night and day, is a hell on earth, and life prolonged for months or years under such hideous circumstances may well drive even the bravest to despair and self-destruction. My own case is a very early one, and I have known cases where girls are practically forced to stay in these places, where parents are urged by the resident doctor to keep them. I have heard cries and lamentations all unavailing.

If such places must exist let them be open to public inspection, so that the very real wrongs suffered there by many of our unfortunate fellow-beings may be heard and righted; and let legislation see that no one can be detained there unless a willing party.

August 29th. ONE WHO HAS SUFFERED.

THE MEDICAL PROFESSION AND THE FALLING BIRTH-RATE.

SIR,—I have read with great interest the papers on the social aspects of the falling birth-rate reported in the JOURNAL for August 20th last, but my admiration for the noble ideas expressed therein is tinctured by the thought that we as a profession should remember that "people who live in glass houses should not throw stones," and should, therefore, before criticizing the falling birth-rate and offering the advice recommended by Dr. Fremantle, set our own house in order. To illustrate my argument, I will use the advertisement columns of the same issue of the JOURNAL in which the above-mentioned articles occur, but the same will apply to the JOURNAL every week. A necessary preliminary to a good birth-rate is, to those who have any respect for the marriage tie, better facilities for marriage and the removal of the ban on those who already have children. We often see and hear of cases where employers of labour or public authorities employ unmarried men only, or stipulate that there shall be no "encumbrances." Turning to the JOURNAL, we find the profession to be just as bad. I am giving the case of those members who have to depend on other members of the medical profession or public authorities for a means of obtaining a living—that is, assistants to general practitioners, and those who hold certain public posts—for example, at hospitals, asylums, dispensaries, and so forth.

In the JOURNAL of August 20th there are 15 applications for assistants; of these, 12 are required to be unmarried (indoor assistant means unmarried). With regard to public posts, taking a salary of £120 as the minimum on which a medical man could possibly keep a wife, there are 14 such posts vacant; of these, 9 specifically mention that applicants must be unmarried, and the remainder do not mention marriage, though it is safe to assume that preference would be given to an unmarried man. As regards the advertisements relating to house-surgeons, etc., it is usually not necessary to mention marriage, since the salary is low and the post only temporary, but out of about 42 such advertisements no less than 14 have thought it necessary to mention that an unmarried man is wanted. These posts are worth from £40 to £100 a year! Fancy insisting that applicants should be single! Do the committees of these institutions think that a married man would apply for such a post, or, even if he did think it worth taking for the sake of experience, is a married man to be considered less capable than an unmarried one?

Dr. Fremantle says "we must insist on the paramount importance of Nature's own methods and checks; on the serious dangers resulting from celibacy, from prostitution, from interference with the normal married life," etc.; but before indulging in polemics of this kind we must ourselves set a good example, otherwise we shall rightly be accused of preaching what we do not practise.—I am, etc.,

Birmingham, Aug. 27th. J. F. BRIDGE, M.B., B.S., D.P.H.

THE DANGERS OF FLANNELETTE.

SIR,—The conclusions of the British Fire Prevention Committee on fire tests with textiles, referred to in your issue of July 23rd, disagree so completely with those come to by myself, especially in reference to the inflammability of flannelette, that I venture to draw your attention to the evidence which I gave before the Departmental Committee on Coroners' Law, which dealt, among other matters, with deaths from burning. This evidence, as a reference to the Committee's Blue Book issued this year will show, was supported by many other independent witnesses who had arrived at the same main conclusion that I had. My evidence was to prove that the various so-called non-inflammable flannelettes were only really non-inflammable till washed. After a few washings in the ordinary way they burnt almost, if not quite, as readily as ordinary flannelette. I demonstrated this to the members of the Committee by actually burning specimens before them.

As 85 per cent. of the deaths from burning are due to the want of fireguards, I argued that the only way to prevent the annual loss of 1,400 lives due to burning in this country was to make it compulsory to have a fireguard fixed in every room occupied by children. Section 15 of the Children Act is a step in the right direction, but this only makes it an offence if the child is burnt from the want of a guard; it punishes the parent when his child is injured, but it does not compel him to take reasonable precautions to prevent his child from injury.

I shall wait with interest the final report of this Committee to see what conclusions they have come to on this matter, after hearing the various views of the many witnesses.—I am, etc.,

Hove, Sussex, Sept. 5th. L. A. PARRY, M.D., B.S., F.R.C.S.

THE NEW MIDWIVES BILL.

SIR,—Mrs. Sidney Webb has, in the JOURNAL of September 3rd, written a letter on this subject which seems crammed full of misstatements and to be argued on wrong premisses.

What is the similarity between a man meeting an accident say by a motor car (one of the "Minority" cars) and a nine months pregnant woman requiring a doctor's assistance?

Accepting Mrs. Sidney Webb's analogy, the obvious answer would be that this man, having had seven months' notice of the possible accident, should have arranged for his own doctor or the Poor Law doctor to be ready to come to his assistance if required.

When has the British Medical Association "warned the Government that to import the Boards of Guardians into the difficult business of providing medical aid will deter the midwife and patient from calling in a doctor"?

So far as my recollection goes this Association preferred the local Health Authority because the profession is sick and tired of battling to no purpose with these antiquated Boards. The interests of the woman was a consequent, not the primary cause of this decision. To put it quite plainly, Mrs. Sidney Webb advocates that medical attendance should be given without any deterrent and free of cost to rich and poor who care to demand it, regardless of the fact that *pregnancy and its sequent is not an emergency*.

Sentiment has run riot over this question.

Let Mrs. Sidney Webb concentrate her agitation on having the bill amended so as to include a clause to compel the midwife to disclose to her prospective patient the limitations of a midwife, and to register the name of a doctor who has expressed his willingness to attend if required.

If this is done, it will be found that the rich who are now out to obtain cheap doctoring at their confinement will not engage a midwife; that the poor need not fear any inquiries made later, because they will have nothing to hide from the authorities or their neighbours; and the midwife will thus be kept in that position she was intended to fill.

Personally, I hope that neither the Association nor any of its members will play into the hands of the thriftless and shameless by supporting Mrs. Sidney Webb's agitation, thereby helping to reduce the incomes of general practitioners and to increase the rates.—I am, etc.,

London, S.W., Sept. 10th. E. ROWLAND FOTHERGILL.

SIR,—Dr. Keay has raised some important issues in connexion with the new Midwives Bill. It is not sufficiently recognized that a keen competition takes place between many junior practitioners and midwives as to who shall attend a large section of working-class mothers in childbirth. This is much to be deplored, because economic

conditions should secure for every mother the services of a doctor and a competent midwifery nurse on such occasions; the doctor ought to see the patient during pregnancy to supervise the labour, and be available if any emergency arises, but it ought not to be necessary to remain in a patient's house for several hours at night to witness a physiological process.

In the face of such competition there may be objections to subsidizing the work of the midwife and in making it easier, if one simply regards pecuniary profit.

Sufficient attention has not been paid to the difficulty which midwives have in getting the patient's friends to call in a doctor. I have met with many complaints, as a practitioner who was frequently sent for by midwives, and as an inspector of midwives. No person can be punished as a criminal who refuses to fetch a doctor in such cases, unless the absence of the doctor would involve cruelty to the child after it has had an independent existence. To emphasize this point, in English law neither the priest nor Levite mentioned in the parable of the Good Samaritan would be liable to criminal proceedings even if the wounded traveller died as the result of such passive inhumanity; the same holds good between husband and wife or relatives and friends, etc.

Clause 17 is apparently the only one which is of much public importance, and as it is not proposed in any part of the bill to compel the friends of a lying-in woman to secure medical aid after a midwife has informed them that such is necessary, it is not giving poor women a proper chance of receiving such assistance to bring the relieving officer and the parish machinery, which the poor loathe, to the rescue of a difficult situation.—I am, etc.,

Barking, Sept. 3rd. A. BYGOTT.

SIR,—By publishing her letter in the BRITISH MEDICAL JOURNAL Mrs. Sidney Webb has invited the criticism of the medical profession, and therefore it may not be inopportune to draw attention to the anarchy and confusion into which it is rapidly being plunged by the fallacious reasoning and erroneous methods of well-intentioned but too enthusiastic socio-political philanthropists.

In the first place, Mrs. Webb is quite wrong in supposing that the doctors' fees are paid as a matter of course by the police when he is called by them. Instances could easily be multiplied in which the police have refused to pay under such circumstances. Philanthropic feeling is so intense at present in pursuit of its object that it does not care who suffers so long as its end is attained, and hence new grievances are created. Indeed, it is quite time that this kind of spirit, which is becoming a popular craze, should be curbed and its unfortunate possessors placed under some sort of restraint.

Women of the class whom Mrs. Webb's kind heart commiserates do not make provision for their confinements, but even in that case payment has for many years already been forthcoming from other sources—namely, the union. But now Mrs. Webb's feelings are offended and her sympathies excited, and she wishes to make still further provision for those who do make some provision already. She points out that Parliament in the first bill made no provision for the doctor's fee. Why? Because it was so utterly heedless in its enthusiasm for the sick of one class that it quite forgot the needs of another class.

What is the difference between this and class or strategic legislation? Verily, we are having a plague of legislative measures. No sooner is one Act passed than we have another amending Act, and there is no longer any doubt that the influence of the sanitary authority (or is it the classical, refined, fully fledged, consulting D.P.H.?) is partaking of the vanity which overleaps itself, and is interfering with the work of the general practitioner in directions with which it is not in any way concerned. Why, for instance, is the general practitioner to be deprived of his occasional midwifery case?

In the instances for which Mrs. Webb pleads, the life of the woman is already protected up to the time of her confinement by the sanitary authority, then the guardians, if necessary, step in, and both her life and the child's is protected by the midwife, or nurse and accoucheur. How, then, can infant mortality, one of the ostensible objects of the fuss, be reduced in the way suggested? The very grievances and hardships of the thrifty and hardworking woman of which Mrs. Webb complains are produced by the interference which is prompted by the opinions which she and her friends hold. What will be the result of a second division of the State being called upon to pay? Just as Dr. Keay has pointed out—that the general practitioner will be pushed out, and a much larger proportion of confinements paid for out of the rates without any corresponding benefit whatever, except some dole to the improvident woman. There is no need for the medical man being called in *on public health grounds*. That, as I have pointed out, is already done. Why do it a second time? If the inquiries of the Poor Law are objected to, their offensiveness can be obviated in other ways than by applying to the sanitary authority or the council.

Again, why should the Local Government Board, in the contingencies which Mrs. Webb looks forward to in the future, be called upon to fix any man's fee? Here will be a pretty precedent! It means that the State will be called upon to fix all fees, and the socialist reveals himself at once. Why should the medical man not be allowed to sell his skill in the best market, or in the alternative why not fix the fees of all the professions? Are Mrs. Webb and the Prevention of Destitution Committee prepared for this?

The profession is "out for fees." We are not ashamed of it. As you remark, Sir, a great profession is smarting under the injustice, for many years, of being compelled by law to facilitate the work of a Local Government Board which is now unwieldy through overloading, or that of the Registrar-General, and to assuage the sorrows of relatives of the dead by giving gratuitous certificates, and for its complacency is now being compelled to give other certificates for 1s., and yet again under a penalty for nothing. Are we to be ashamed of protecting our industry and generosity to the public health and welfare? We shall shortly have to protect ourselves against osteo-arthritic-therapy (*sic*). Between now and November, during which Mrs. Webb wishes us to furbish up our political influence, we hope to have intervals of sunshine and fine weather.

Let Mrs. Webb and her kind-hearted friends take a holiday, and not turn the State upside down by political agitation, for destitution (poverty) will always be with us, nothwithstanding the efforts of the National Committee. I enclose my card, and subscribe myself, Yours, etc.,

September 6th. A POOR LAW MEDICAL OFFICER.

FEES FOR MEDICAL EXAMINATION FOR INSURANCE.

SIR,—The letter of your correspondent "X." in the JOURNAL of September 3rd raises a very small grievance out of the many that our profession has against insurance companies, or, more accurately, the agents of such. Let me point out to "X." troubles more serious:

1. If the doctor conscientiously examines the proposer in order to fill up the form, probably the next case from that agent will be sent to another doctor.

2. If the doctor makes an unfavourable report, even to a slight extent, he will receive no further work from that agent.

3. Agents, not all I hope, expect the doctor to canvass for cases, and a doctor is chosen who will give up a large part of his time to canvassing. In some instances it is the doctor's wife who undertakes this piece of work.

4. So independent of doctors are insurance agents that some will only give a doctor work on condition that he fills up the medical report form without even having seen the proposer, and I am sorry to say that some medical men stoop even so low as to walk into the agent's office and fill up a bundle of forms that have been waiting for his weekly visit, after which he walks out pocketing both his fees and his conscience. I refused money on such conditions not long ago myself. Verily, it does not pay to be troubled with that thing called "conscience" nowadays! I sometimes wonder do the directors know of the tactics of their agents. I am inclined to think they do, and wink at it, too.

In the profession the result works out like this: "wasters" are supported and perpetuated at the expense of the honest man who will not stoop to such dirty work. —I am, etc.,

September 8th. CLEAN HANDS.

THE TREATMENT OF PULMONARY TUBERCULOSIS.

SIR,—I must thank Dr. T. Gerald Garry for his mention of my paper on the physical signs of incipient pulmonary tuberculosis and its treatment by continuous antiseptic inhalation, published in the BRITISH MEDICAL JOURNAL for December 11th, 1909, and am glad to find that the statements made in that paper meet with his approval and are confirmed by his own experience. He tells us that the plan of treatment recommended in that paper "is practically the same" as that which he has "practised most successfully for over twelve years." It would be most useful if he would give your readers some details of the cases which he has treated in this manner, and of the results obtained. Will he also tell us what precise combination of antiseptic drugs he has been in the habit of employing, and also *for how many hours out of the twenty-four* his patients have worn the inhaler? Many physicians have followed the advice of Dr. Yeo as to antiseptic inhalation, but the period of use of this remedy has been usually far too limited, and I know of no published cases except my own in which the absolutely continuous use of the remedy has been insisted on.—I am, etc,

September 13th. DAVID B. LEES.

SPIRITUAL HEALING AND THE "GUILD OF HEALTH."

SIR,—In my last letter I pointed out that Dr. Bousfield's original article was inaccurate in almost every respect. He now says that I have "evaded the whole point" of his article. I am obliged, therefore, to ask once more the hospitality of your columns. His criticism includes apparently two charges: (1) That by undertaking the position of Warden I "give the guild the approval of a clergyman of the Church of England, which weighs heavily in increasing its membership." It is quite true. I wish my approval weighed more heavily. Indeed, I am touched by this unsuspected importance of an obscure curate. (2) "He uses this wide-spreading medium to obtain cases on which to practise spiritual healing." But I do not do anything of the kind. I have hardly ever accepted "cases" who were not connected with the Church of which I am a curate, or personal friends of my own. Dr. Bousfield's idea of our members "canvassing their friends to come to" me, or any of their "clerical fellow-members," is simply ludicrous. The two statements quoted by him are obviously not contradictory at all. The one concerns the guild; the other concerns myself. Whatever I do, I do as a clergyman of the Church of England. The guild is not concerned, and, indeed, knows nothing whatever about it. Except in a very few cases, I have invariably advised people who write to me from a distance to apply to the clergy of their own district.

In regard to the case Dr. Bousfield persists in referring to, I have merely to repeat my request that he would show me what "great responsibility" I undertook and what danger there was in doing what I did. It is hardly an answer to make a general statement about the risk of dealing with cases without medical advice, as I have stated most emphatically my entire agreement with such a perfectly obvious truth.

Finally, the guild, as I said before, is not "founded for such a purpose," which in his letter means the supply of spiritual healing.

I do not in the least mind criticism. It is precisely what is wanted. But it is reasonable to ask that any one who desires to criticize a person or a guild should take the trouble to find out the truth about the matter, and should not prejudice public opinion by misrepresentations which, if they are unintentional, are not the less inexcusable. I suggest to Dr. Bousfield that we should reserve our energies for the more profitable task of studying some of those difficult questions which are involved in this matter, and which I indicated in my article which appeared in your issue of August 20th.—I am, etc.,

FRANCIS BOYD,
Clifton, Sept. 7th. Warden of the Guild of Health.

SIR,—After long absence abroad, I picked up the BRITISH MEDICAL JOURNAL for August, and have read there on page 464 an astonishing attack on the Guild of Health and its Warden, the Rev. Francis Boyd, by Dr. Stanley Bousfield, M.A., M.B.Cantab. I have read it carefully, and utterly fail to see what it is that Dr. Bousfield finds to criticize in the actions of Mr. Boyd or the existence of the Guild of Health.

If Mr. Boyd had been doing what many others do with impunity—that is, trespassing on the domain of the Medical Faculty, and playing tricks on a patient—I could understand Dr. Bousfield's position, but apparently he has done neither one nor the other.

But what I should like to ask is, Why was Mr. Boyd asked to assist the lady in question? Why are the clergy ever asked if they can help in times of sickness—why do faith healers or spiritual healers exist at all?

I venture to answer this question by an analogy. In Church matters, what originally gave rise to Dissent? Every honest Churchman knows that Dissent came into existence as a consequence of the shortcomings of the Church; and in the same way all sorts of "healings" have also arisen to supply a felt need on the part of the laity, who, having spent all their substance on physicians, who have hitherto blinded themselves to the possibility of anything beyond a material aspect of disease, fly as a last resource to the Gospels, and for comfort and consolation to the clergy in conditions rendered hopeless often by the ignorance and incompetency of medical men. I consider Dr. Bousfield's attack on Mr. Boyd one of the most unfair things I have ever read.

In the first place, what does he mean by "treated"? It is a term used to imply all sorts of charlatanism, and therefore, apart from the medical profession, misleading.

What Mr. Boyd actually did was quite within the scope of his profession. He endeavoured to bring about the very thing which, as a rule, is conducive to the success of the doctor's remedies, a firm belief in the health-giving influence of the Divine Presence, and His unchangeableness and therefore willingness, to relieve suffering, in order to bring about in the patient that calm, collected attitude towards her physical condition which every doctor recognizes as an enormous asset to his own work.

In using either the laying-on of hands or Holy Unction, Mr. Boyd would be entirely acting in his own province and be but obeying a scriptural injunction.

In his attempts to undermine the Guild of Health, Dr. Bousfield is attacking one of the sanest and most practical societies of late years. It is the Church's own effort, inside the Church, to bring together thoughtful men and women to study their Gospels and learn therefrom the message in time of sickness. It constitutes a wise provision on the part of Church people against the onslaughts of the many fallacious cults, such as Christian Science, which with dangerous philosophy and still more dangerous action often neutralize medical treatment, and by raising false hopes bring about the very form of physical excitement that is most antagonistic to beneficial results.

Therefore it is a pity that this eminent doctor should single out a professional man acting quite within the limits of his profession, and a guild which was originally started some years ago for the very express purpose of bringing about those very conditions which are most beneficial to medical practice.

But, thank God, all doctors do not view the work of conscientious clergymen through Dr. Bousfield's spectacles. As an obscure minister of the Word, I have for the last fifteen years practised what he speaks of as "spiritual healing." I have done nothing more and nothing less than that for which Dr. Bousfield seeks to vilify Mr. Boyd; and I can confidently say that the majority of the cases which I myself have dealt with have been those sent to me by men who stand high in the list both of specialists and general practitioners. But I rather think that so far from harming either the guild or its excellent Warden, this most unfair attack on the part of Dr. Stanley Bousfield, M.A., M.B.Cantab., will only tend to advertise the one and strengthen the hands of the other.—I am, etc,

BOUSFIELD S. LOMBARD, M.A.Cantab,
September 7th. British Chaplain, St. Petersburg.

THE PROVISION OF DIPHTHERIA ANTITOXIN.

SIR,—In a leaderette in your issue of September 3rd you criticize my letter on the above subject. May I be permitted to comment on your criticism?

1. You say: "The truth is that during the fifteen years before the introduction of antitoxin the death-rate rose

steadily from 120 to 318 per million; during the fifteen years after the introduction of antitoxin it fell steadily from 291 to 157."

This is scarcely correct. In neither the pre- nor post-antitoxin period was there a "steady" rise or fall. It is a characteristic of diphtheria all the world over, as I have shown by numerous statistics in my brochure, *The Antitoxin Treatment of Diphtheria*, that it comes for the most part in epidemics, and the death-rate varies in proportion to its severity quite independently of any alleged remedy.

For instance, beginning with the year 1879, when the rate per million was 120, it dropped to 109 the next year, and rose again to 121 in 1881. Then it remained fairly constant for ten years, averaging 163 per million, which would have been considerably less but for two abnormal exacerbations in 1884 and 1889.

Then it ran up with an almost vertical column in 1892 and 1893 to 222 and 318 respectively, dropping down to 291 in 1894—the last of the pre-antitoxin years. It was not until towards the end of 1895 that antitoxin came into general use in this country. A decline in the death-rate had therefore set in twelve months before.

Then came a fairly constant rate, averaging 266 per million for another eight years, during which period antitoxin was being pushed extensively; the average rate during this period, in spite of antitoxin, exceeded the previous (pre-antitoxin) period by nearly 75 per cent.

In 1902 a decline commenced, and now for the last six recorded years there has been a steady rate between 157 and 182, averaging 168 per million. But this rate has not reached to so low an ebb as it did during the ten years from 1882 to 1891, although antitoxin has been more vigorously resorted to than ever.

The ten years' rate of mortality following the introduction of antitoxin represents the highest decennium on record; and no year nor any group of years since can show so low a rate of mortality as that which obtained before antitoxin became fashionable.

Or, taking the years corresponding to your figures as a whole, the average annual rate per million for the fifteen years before antitoxin works out at 171.4, whereas the fifteen years after show no less than 228 6. In other words, the average death-rate per million during the fifteen years since antitoxin has been in use is 25 per cent. greater than in the fifteen years before it was introduced.

2. But you urge that "thousands of cases, thirty years ago, and less than thirty years ago, were called 'croup,' which would now be called 'diphtheria.'"

Such a statement could not be constituted evidence unless backed up by statistical proof. Fortunately, the Registrar-General does provide statistics upon this interesting point which leave no question as to the result, for he gives the average annual death-rate per million of diphtheria and croup together in ten-year periods as follows:

1861–70.	1871–80.	1881–90.	1891–1900.
390	261	286	314

Now the apologists for antitoxin are faced by the fact that in 1871–80 the death-rate from diphtheria and croup combined was only 261 per million, whereas in 1891–1900, after six years of antitoxin treatment, it had risen to 314! Moreover, there is the peculiar fact that the death-rate of the first decennium fell from 390 to 261 in the second, showing that the ordinary laws of epidemicity can account for the rise and fall of mortality in absolute independence of antitoxin.

3. In reply to my statement that the hospital fatality has been reduced by reason of the inclusion of numbers of cases of bacteriological diphtheria possessing no clinical signs of the disease, you ask how do I "account for the reduced mortality in cases of laryngeal diphtheria and in tracheotomy cases."

The answer is very simple. Since the introduction of antitoxin there has been an increasingly urgent demand that all cases of diphtheria, bacteriological or otherwise, should be removed to hospital, so that instead of, as formerly, cases of severe diphtheria being hurried into hospital for operation at the last moment when the patients were practically moribund, they are now secured earlier, whereby intubation or tracheotomy can be performed before it is too late.

4. In quoting my statement that "the fatality in the cases where antitoxin has not been used has been reduced to a much greater extent," you inquire "Reduced from what?"

My argument is that the table of the Metropolitan Asylums Board, giving 11,716 reputed cases of "diphtheria" from 1895 to 1907 treated without antitoxin, shows a greater reduction in fatality than does the table of 63,249 cases treated with antitoxin. The latter shows a reduction from 28.1 to 10.37; the former shows a reduction during the same period from 13.4 to 2 84—that is, double as much. The fact that all the moribunds, the complications, and the second-week cases were put into the non-antitoxined table only makes the result the more remarkable. At the same time, the inclusion of these cases in this table and their elimination from the table of antitoxined cases vitiates both tables, and constitutes them an unscientific presentation of statistics.

5. In conclusion you say you "prefer the general experience of medical men to my opinions."

This you are justified in doing, providing "the general experience" is based upon sound and scientific reasoning and that my "opinions" are proved to be devoid of such. But to follow this expression by saying that antitoxin "has saved by this time not less, probably, than a quarter of a million lives" only adds an unsubstantiated general "opinion" to an unproved estimate of "general experience," and provides no evidence for the assumption. The evidence, as I think I have shown, goes all the other way.—I am, etc.,

WALTER R. HADWEN, M.D., J.P.,
President of the British Union for the Abolition of Vivisection.

Gloucester, Sept. 6th.

⁂ We have thought it right to publish this letter; but we are content to leave the question to the judgement of the medical profession, after fifteen years' experience, not only in this country, but over all the civilized world.

Obituary.

JOSEPH NELSON, M.D.,

CONSULTING OPHTHALMIC SURGEON, ROYAL VICTORIA HOSPITAL, BELFAST.

IT was with very sincere regret that the profession and public in Ulster heard of the death of Dr. Nelson, which took place in one of the private hospitals in Belfast on the morning of August 31st. Dr. Nelson had been in ill health for the past few months, but only those in immediate attendance were aware of the gravity of his condition. Dr. Nelson was 70 years old when he died, but up till a few months ago looked hale and well.

His was a remarkable and adventurous career. He was born in Downpatrick, co. Down, and was the son and grandson of well-known clergymen. He entered the Faculty of Medicine in the old Queen's College in 1858; but in 1860, in company with a fellow student, Alexander Blakely Patterson, afterwards an Indian judge, and now the only survivor of the handful of Englishmen who took part in the Sicilian expedition, he volunteered for Garibaldi and joined that General in Genoa. They left Genoa in a tramp steamer, and after a week at sea, on May 11th, 1860, they entered and captured Marsala. Young Nelson was also in the march on Palermo and fought at Calatafimi, where Garibaldi's "thousand redshirts" of students, poets, journalists, and artisans, utterly routed King Bomba's fifteen thousand so-called regulars; three times were they beaten back under hot artillery and musketry fire from the last ridge, but finally carried it with the bayonet and routed the foe. Twelve days later they marched into Palermo; and on August 22nd crossed the Straits of Messina and marched through Calabria and entered Naples. After the battle of Volturno, they were joined by Victor Emmanuel, whom Garibaldi proclaimed king of a united Italy. Young Nelson was through this campaign and fought in all the battles; he received a lieutenant's commission in the Regimento Inglese, was presented with a sword by Garibaldi, and subsequently received two medals from the King of Italy. He was fortunate enough to escape both wounds and illness. Returning to Ireland he completed his studies at Belfast and took the M.D. of the old Queen's University in Ireland in 1863, and the

L.R.C.S.I. in the same year. He set out for India as surgeon to a tea plantation; he stayed in the East fourteen years, and acquired several valuable estates as well as skill as an ophthalmic surgeon. Here he also joined in an expedition against the Manipuris, for which he was awarded a war medal. Returning to Ireland, he pursued the study of his speciality in Dublin, and learnt German; he then went to Vienna, acting as assistant to Arlt and Fuchs, and a year later was appointed to the newly-created post of Surgeon to the Eye, Ear, and Throat Department in the old Royal Hospital, subsequently the Royal Victoria Hospital, Belfast, and later to the Hospital for Sick Children. On reaching the age limit in the former institution he retired, greatly to the regret of his colleagues, who presented him with a handsome service of plate, and he was appointed consulting surgeon.

Dr. Nelson had been President of the Ulster Medical Society, and on the visit of the British Medical Association in 1884 was Secretary of the Ophthalmic Section. He was pressed on more than one occasion to accept the Presidentship of the Ulster Branch, but he was always shy of such offices, although a keen attender when any subject his own speciality was being debated. He was a most devoted son of the old Queen's College and Queen's University. To his last day he upheld the highest type of education, and, being endowed with unusual common sense and good judgement, he saw the futility of make-believe and shams. Dr. Nelson's professional relations were of the happiest, and for many years he had one of the largest consulting practices in his department in Ulster, so that his name was a household word. In everything he undertook—whether a dinner, the electric lighting of a room, or the treatment of a patient—he had the happy knack of hammering out every detail until he was satisfied that the best was being done.

Dr. Nelson was twice married, and leaves a widow and five children, most of whom are grown up, and with whom deep sympathy is felt.

Dr. Temple C. Paley, who died recently, was for many years associated with the city of York. He was a grandson of Archdeacon Paley of Carlisle, the famous author of *Evidences of Christianity* and other theological works which long enjoyed great popularity. Dr. Temple Paley was a son of a former Vicar of Easingwold. He received his medical education at University College, London, and was admitted a Member of the Royal College of Surgeons of England in 1846, and a Licentiate of the Society of Apothecaries in 1847. He obtained the M.D. degree from the University of St. Andrews in 1873. He settled in York in 1853, and resided there for a lengthened period. Originally he was House-Surgeon at the York County Hospital, and held that position for three years, but on the Crimean war breaking out he rejoined his regiment, the old West York Militia, of which he was surgeon-major, and went with them to Gibraltar, subsequently joining the battalion for active service. Dr. Paley was noted for his devotion to his duties, and during a severe cholera epidemic at Gibraltar won the regard and esteem of all ranks, making many lifelong friendships. After his return to York he recommenced his medical practice. He was very much respected and beloved as a medical practitioner, and had numerous patients amongst all classes of residents, both in the city and county, and his death will be widely regretted. He had been living for several years at Malvern, and enjoyed good health, though failing somewhat recently. Dr. Paley was 85 years of age, and was a J.P. of Lancashire.

Dr. Robert Baker, for many years the head of the Retreat, York, died on August 18th, at the age of 67. A native of Thirsk, he received his medical education at Edinburgh, where he took the degree of Doctor of Medicine in 1864. After practising for some time at Thirsk he took over the private asylum at Lawrence House, York, from Dr. Swanson. In 1874 he succeeded Dr. Kitching as medical superintendent of the Friends' Retreat at York, and continued in that capacity until 1892. In that year he became visiting medical officer to the Retreat, which position he held up to the time of his death. He was skilful in his profession, and was a consistent exponent of the humane treatment of mental diseases, the extension of which he constantly urged. During his connexion with the Retreat many improvements and extensions were carried out, notably the opening of the Gentlemen's Lodge in 1876, the East Villa in 1881, and the West Villa in 1890. He was a member, and at one time president, of the Royal Medical Society (Edinburgh), and also of the Medico-Psychological Association, which met at York while he was its president. Dr. Baker was at one time resident physician, and also resident surgeon, of the clinical wards of the Edinburgh Royal Infirmary. He contributed several important articles to the *Journal of Mental Science* and other periodicals on insanity, and also published some pamphlets on the subject.

Eduard Henoch, whose name is a household word to all students of children's diseases, died on August 26th, at the age of 90. He was born at Berlin on July 16th, 1820, and studied medicine there under the famous clinician Romberg, who was his uncle, and Schönlein. He took his degree in 1843, and was afterwards for a considerable time assistant to Romberg. In 1858 he was appointed Professor Extraordinary at Berlin, where he passed the whole of his career. From 1872 to 1893 he was head of the children's clinic in the Berlin Charité. In 1894 he retired. He was the author of many works, the best known of which was his *Lectures on Children's Diseases*, which has been translated into several languages, and was recognized as authoritative throughout the medical world.

Dr. Paolo Mantegazza, well known by his popular writings on scientific subjects, died on August 28th, in his 80th year. Born at Monza in 1831 he studied at Milan and at Pisa, graduating as Doctor of Medicine at Pavia. He began to teach in 1858, after having spent some time in South America. In 1860 he was appointed Professor of Pathology at Pavia—the first Chair of the kind established in Italy—and a laboratory for experiments was also fitted up for him. In 1870 he became Professor of Anthropology in the Istituto di Studii Superiori at Florence. He was the author of works on such subjects as the physiology of pain, the physiology of pleasure, the physiology of love, etc. He was a great traveller, and recorded his experiences in books on the Rio de la Plata, Teneriffe, Lapland, and India. He also took an active part in politics, sitting in the Chamber of Deputies in four successive Parliaments His medical knowledge made him especially useful in the discussion of questions of hygiene. In 1876 he was created a Senator of the Kingdom of Italy.

Friedrich Daniel von Recklinghausen, the famous pathologist, whose death was recently announced in the Journal, was born at Gütersloh in 1833. He was a pupil of Rudolf Virchow, whose assistant in the Pathological Institute he was for six years. He also worked under Rokitansky at Vienna. In 1865 he was appointed Professor of Pathological Anatomy in the University of Königsberg. In the following year he accepted a "call" to Würzburg, and in 1872 he became Professor in the newly-founded University of Strassburg. He made many important discoveries in pathology, and was the author of numerous contributions to the literature of that department of medical science. As a teacher he had a great and deserved reputation. He was a man of fine personal character. He resigned his Chair in 1906.

Dr. J. Brown Sim, of Nottingham, who died recently, was born at Stewarton, near Glasgow, and was educated for the medical profession at Glasgow University, where he took the degrees of M.B. and C.M. in 1873, and M.D. in 1876. For a time he was House-Surgeon at the Glasgow Royal Infirmary and at the Lock Hospital. He afterwards settled in practice at Nottingham. In 1890 he became a member of the Nottingham City Council, and ceased to sit for that constituency after the elections in 1908. He served for a year with distinction the office of Sheriff, and as Chairman of the Parliamentary Committee he took a leading part in a number of important matters relating to the government and development of Nottingham. He was also for a time Vice-Chairman of the Watch Committee.

Medico-Ethical.

The advice given in this column for the assistance of members is based on medico-ethical principles generally recognized by the profession, but must not be taken as representing direct findings of the Central Ethical Committee, except when so stated.

THE USE AND ABUSE OF TESTIMONIALS.

QUERIST.—Medical practitioners should take care, when giving written testimonials, to be sure they will not be abused for purposes of advertisement. But there is no rule of medical etiquette forbidding the giving of testimonials to nurses, masseurs, or masseuses, nor any impropriety in the reasonable use of such testimonials by the recipients.

THE SERVICES OF A SUBSTITUTE.

C.—When one practitioner acts as a substitute for another without any previous arrangement, he is by custom entitled to half the fee, but there is no doubt that in law he could claim the whole. Not to acknowledge such friendly help by a due expression of thanks and the offer of half the fee would be a breach of professional etiquette of which we should be sorry to think any medical practitioner knowingly capable.

NEWSPAPER NOTICES OF MEDICAL PRACTITIONERS.

A CORRESPONDENT sends us a copy of a Bournemouth paper which contains a notice and portrait of the local schools' medical officer, and comments upon it as a professional advertisement. We have repeatedly pointed out, however, that there is no means of preventing the press from giving notices of public officials, and that it is unfair to make their subjects responsible for the zeal of journalists. Moreover, an official who is not in private practice is not open to the suspicion of doing anything directly or indirectly to attract patients. The same remarks apply to a cutting from the *Sheffield Independent*, which contains the report of a meeting of the Bakewell Board of Guardians, where one of these worthies spoke in favour of the candidate who was elected to fill the post of district medical officer as a "jolly good fellow," who "never looked for a rise of salary, and consequently was a gentleman. He had done his work well and never troubled about wages." Doubtless, from the point of view of the guardians, these are excellent qualities, but the recipient of such praise might tell a different story.

AN anonymous correspondent sends a cutting from a Welsh newspaper, which gives some account of the arrangement by which a workhouse medical officer is leaving that post to enter into partnership with a neighbouring practitioner, and adds a sarcastic comment, of which the point is that such a notice is advertising by the parties concerned.

*** As has often been pointed out, it is impossible to prevent newspapers mentioning official changes and adding such scraps of information as they can gather together, but it is uncharitable to assume without evidence that either of the medical practitioners concerned is responsible for or had any knowledge of its publication.

MEDICAL ADVERTISING.

J. C. W.—Although every one distinguishes between advertising for practice and those indirect methods by which a medical practitioner brings himself and his affairs before the public, the latter are not to be condoned because not amenable to the graver censure of the General Medical Council. We think that a practitioner who should allow a photograph of himself on his motor car to be circulated by the agent for a particular machine, and furnish a glowing testimonial in its favour to be printed upon the same postcard advertisement, would not act in accordance with what most members of the profession would regard as the better rule.

MEDICAL PRACTITIONERS IN CHEMISTS' SHOPS.

C. W. H. N.—In former days it was by no means uncommon for a medical practitioner holding the Licence of the Apothecaries' Society to keep a regular chemist's shop, but this has become almost a thing of the past. At the present time, we imagine, it would be difficult to find a registered medical practitioner to take such a post as that described.

CIRCULARS TO PATIENTS.

W. H. C.—It is customary to send out a circular to bona-fide patients to announce the accession of a partner to a medical practice

INTRODUCTION TO PRACTICE.

C.—In the circumstances, a circular signed by the vendor should be sent to those patients whom he has not been able to introduce personally, and C. should call on them or leave cards as soon as possible.

BRANCH SURGERIES AT CHEMISTS' SHOPS.

DEIR.—We have frequently pointed out that there are obvious and serious objections to medical practitioners having branch surgeries at chemists' shops.

Medico-Legal.

FEES TO MEDICAL WITNESSES.

A MEMBER writes that he has been subpoenaed to attend as a medical witness at the Middlesex Sessions, Guildhall, Westminster. He wishes to know what fee he is entitled to. He resides in the Enfield district.

*** He is entitled to travelling expenses, and 1 guinea a day.

WHO IS TO PAY?

M. W. B.—A workman while at his employment meets with an accident, and goes to B., the nearest doctor, for attendance. He presents his employer's card, and is attended by B. Can B. sue the firm for his fees?

*** If the employers sent the workman to B. for attendance, and the card was intended as a voucher that the firm would be liable, B. could recover from the latter. Otherwise, B. can only look to his patient for payment.

LOCUMTENENTS AND FEES FOR MEDICAL EVIDENCE.

S. S. inquires whether a locumtenent is entitled to the whole or a part of the fees for attending the coroner's or other courts, or performing *post-mortem* examinations: (*a*) In case of sudden death, or accident, where the locumtenent saw the case from the first. (*b*) Where the principal first saw the case, and the coroner's order for *post-mortem* examination, etc., was dealt with by the locumtenent.

*** All fees for attendance at the coroner's, or other, courts belong to the principal exclusively, provided that such attendance has taken place during the time the locumtenent has been in the service of the principal. The same applies to fees for *post-mortem* examinations.

DEATH CERTIFICATES AND INSURANCE PAYMENTS.

ENQUIRER asks whether it is legal for any friendly society to pay the amount insured simply on the production of a medical certificate of the death of the insured.

*** It is not legal to pay insurance money without the production of a certificate from a registrar that the death has been duly registered according to law. The medical death certificate can only be used for the purpose of registering the death.

PARTNERS AND PROFITS.

BELISARIUS writes that an arrangement of the following character was entered into between two practitioners A. and B. A. succeeded B. on the understanding that he was to pay to B. one-third of the annual receipts of the practice for three and a half years. After this agreement had been entered into, A. was appointed a part-time school medical inspector under a county council. Should the emoluments from this office be added to the receipts from the practice in arriving at B.'s share?

*** In the absence of express agreement to the contrary, *all* emoluments of a professional character received by A. in carrying on B.'s former practice should be reckoned in arriving at B.'s share.

APPOINTMENTS OF CORONERS AND POLICE SURGEONS.

POLICE writes to ask for information as to the appointments of coroners and police surgeons; also as to the proper person to whom to apply concerning such appointments.

*** There is no one authority which appoints coroners for England and Wales. These officials are appointed as vacancies occur (generally occasioned by death) after the necessary writ has been issued by the Lord Chancellor directing local authorities to fill up the vacancy in question. These local authorities are county councils, borough or city councils, etc., as the case may be, and to these authorities aspirants for appointment to the vacant office should make application. As to police surgeons, we believe that the Surgeon-in-Chief of the Metropolitan Police has the appointment of the district medical officers of that force. Chief constables of counties or other large districts have doubtless great influence in filling up any casual vacancies.

WORKMEN'S COMPENSATION.

Refusal to be Examined.

In a case at Dunfermline (August 12th) it appeared that the contractors who are building the new dockyards at Rosyth had paid compensation at the rate of 9s. 8d. per week for six weeks to a man who had been injured on their works. They then refused to pay anything further on the ground that the accident was not sustained in the course of the employment, the injury having been caused by the workman pricking his thumb with a pin, which caused suppuration of the thumb. It having been held that the employers having admitted liability could not now back out, they took the further point that the man was no longer incapacitated. The workman refused to submit to a medical examination, in consequence of which the sheriff suspended the compensation until the workman should consent to allow himself to be examined.

Stoppage of the Nose.

In a case at Chepstow (August 15th) it appeared that in July, 1908, the applicant, who was employed at an ironworks, was injured in the head, nose, and face, with the result that there was thickening of the membrane of the nose and one of the tear ducts. He subsequently resumed his employment and worked for defendants in various ways. In April, 1910, he was put to unload bricks, the dust from which obstructed his nose, and in consequence of its abnormal condition inflammation was set up. He was subsequently away from his work from April 7th to May 5th; and, as the trouble recurred, he was further incapacitated from June 6th to 14th. In these circumstances the judge held that the man had been the victim of an accident, and made an award in his favour.

Rights and Duties of Certifying Surgeons.

A curious point was referred to in an answer by Mr. Churchill in the House of Commons on August 3rd. It appeared that a workman who was suffering from lead poisoning applied to Dr. Young, of Liverpool, for a certificate of disablement. Dr. Young referred him to Dr. Knox, who was acting for another Dr. Young, the certifying surgeon under the Factory Acts. Although Dr. Knox had previously examined this man for the Federated Employers' Association, it appears that he was still bound to give the certificate in question. Mr. Churchill pointed out that he had no power, even if he had the desire, to authorize the workman to apply to any surgeon other than the factory surgeon or his duly appointed substitute.

Duty to Undergo an Operation.

County-court judges are wont to show a considerable amount of scepticism when it is alleged that an operation will enable a man to earn more wages. In a case at Middlesbrough on August 8th it appeared that as the result of an accident to a hand blood poisoning set in, and the index finger became permanently stiff. Evidence called on behalf of the employer was given to the effect that the man's incapacity to work was largely due to his refusal to have the finger removed, and that were it removed he would be able to do light work. On these grounds a diminution of the compensation order was asked for. Evidence was given on the workman's behalf to show that he was not fit to undergo an operation, and also that there was trouble in the palm of the hand which would extend the scope of the operation to considerably more than one finger. An examination having been made by a medical referee, His Honour said he was satisfied that the man's hand would be better if the finger were amputated; but, even so, he doubted whether the man could earn his old wages, or even get employment. He suggested, therefore, the payment of a lump sum in settlement, and the case was adjourned for two months.

The Services.

INDIAN MEDICAL SERVICE.

STUDY LEAVE.

The Government of India has ruled that officers on furlough or other leave, who wish to have part of it converted into study leave, must address the Under Secretary of State, India Office, and should attach (1) a statement showing how they propose to spend the study leave, and (2) documentary evidence that their application for the particular course of study or examination proposed has the approval of the proper authorities in India. Further, officers on furlough or other leave who desire to have it extended for purposes of study should address the Under Secretary of State, but in addition to the above requirements they must support their applications with documentary proof of their having obtained the approval of the authorities concerned in India to their applying for an extension of leave.

ST. JOHN AMBULANCE BRIGADE.

Lieutenant-Colonel Twiss, R.A.M.C., writes to point out that the communication to which reference was made in the article published in the Journal of September 10th, p. 731, was sent to the pupils of the Southampton centre of the St. John Ambulance Association, *except* those trained under the auspices of the British Red Cross Society and those whom he knew already belonged to its Voluntary Aid Detachments.

Public Health

AND

POOR LAW MEDICAL SERVICES.

DISINFECTION AFTER SCARLET FEVER AND DIPHTHERIA.

Dr. Charles V. Chapin, the Superintendent of Health of the City of Providence, Rhode Island, has frequently thrown doubt upon the necessity for disinfecting premises after the presence in them of certain infectious diseases. In his annual report for 1909 he states that he considers disinfection after diphtheria to be useless unless it can be shown with a reasonable degree of certainty that all the members of the affected family are free from the diphtheria bacilli. Consequently he decided early in 1905 to give up disinfecting after diphtheria unless two successive negative results could be obtained from every member of the family. Owing to the unwillingness of most persons to submit to the taking of cultures, very few disinfections had been done since that time. In the four years prior to 1905, when disinfection was carrried out, there were 25 recurrences of the disease after 1,457 families had been infected, equal to 1.71 per cent. During the five years in which there had been no disinfection there had been 42 recurrences in 2,019 families, equal to 2.08 per cent. Dr. Chapin considers, however, that the danger of omitting disinfection is probably better measured by the development of the disease in persons who go away from home during the sickness and return when it is presumed they may do so with safety. The percentage of attacks among those returning home after disinfection during the fifteen years 1889–1904 was 0.88; and since 1905, when there had been no disinfection, the percentage of attacks was only 0.18. Since the end of 1908 disinfection after scarlet fever had not been urged, but it had been offered; and up to the end of 1909 67 persons had returned to scarlet fever houses where there had been no official disinfection, and not one of these persons was attacked with the disease, whereas during the ten years ending 1909 nearly 2 per cent. of those who returned to disinfected houses became infected.

BACK TO-BACK HOUSES.

When the Housing, Town Planning, etc., Bill was passing through the House of Commons efforts were made, at the instance of certain North-Country towns, to throw out the clause which prohibited the erection of back-to-back houses. The President of the Local Government Board supported the inclusion of the clause by quoting the well-known results of several medical officers of health and others, who had shown conclusively that the death-rates from all causes and from respiratory diseases was very much higher in back-to-back houses than it was in those dwellings which were provided with through ventilation. Within the past two years further exhaustive investigations into the same question have been carried out for the Local Government Board by Dr. Darra Mair, which have confirmed the results obtained by previous inquiries.[1]

SOCIETY FOR THE PREVENTION AND CURE OF CONSUMPTION IN THE COUNTY OF DURHAM.

The County of Durham Society for the Prevention and Cure of Consumption held its eleventh annual meeting at its sanatorium, Stanhope, on June 25th last, when the report for the year ended April 30th, 1910, was presented. In referring to the preventive work of the society, it is noted that the death-rate for tuberculosis for the county has fallen from 2.13 in 1897 to 1.7 in 1908—a saving of life which is eminently satisfactory. The sanatorium at Stanhope, which was opened in May, 1900, has accommodation for 45 men, whilst a second sanatorium at Wolsingham, which has just completed its first year of work, accommodates 28 women and children. Altogether 225 patients have been admitted during the year which is the subject of the present report. Of these, 101 have been sent to the sanatorium by various local authorities in the county of Durham who have retained beds. Unfortunately less than one-fourth of the cases were admitted in a curable stage of the disease. The results of treatment at the two institutions show a close agreement with those recorded in other sanatoriums, and emphasize the importance of admission in the early stage of the disease. In these circumstances, the small proportion of early cases admitted is unfortunate.

INSPECTION OF FOOD SUPPLIES IN HULL.

The Sanitary Committee of the Corporation of Hull is fully alive to its responsibilities in connexion with the inspection of foodstuffs which are manufactured on a large scale. Consequent upon the city analyst finding a leathery mould in some jam submitted to him for examination, the chief food inspector has reported the result of investigations he has made at the jam factories in the city. It appears that a great deal of jam is made from fruit pulp, which is fruit that has been boiled in steam-jacketed pans. This pulp is placed in large stoneware jars or barrels which are sealed up with corks and resin. On

[1] Report on Back-to-back Houses. By Dr. L. W. Darra Mair. With an introduction by the Medical Officer of the Board. Cd. 5314. (3d.)

the surface of nearly all fruit pulp a mould forms which does not penetrate much into the substance, and when jam is properly made the layer of mould should be sliced off the top of the pulp. In some cases, however, the pulp is poured out through the bung-hole of a cask, when the mould gets incorporated in the substance of the jam. At a recent meeting of the Sanitary Committee the city analyst reported that in not one of fifty-five samples of flour which had been sent to him for examination had he found any mineral adulterant; all were found to be pure wheat flour without the addition of alum or of any foreign grain such as soya flour.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

Essex.—The estimated population of the administrative county of Essex at the middle of 1909 was 1,070,973, or a quarter of a million more than the number recorded at the last census. The birth-rate was 22.9 per 1,000 and the death-rate 10.7 per 1,000. The infantile mortality-rate was 80 per 1,000 births. In the preface to the report the county medical officer of health, Dr. J. C. Thresh, refers to the insufficiency of the information which is given in some of the reports of the district medical officers of health, who do not, he states, point out sanitary defects which require remedying and improvements required in administration. He admits that some of the medical officers of health in the county have not hesitated to express the opinion that if they opened their minds too freely in their reports they would soon cease to hold their appointments. With this view Dr. Thresh does not appear to be in agreement, and he asks if those medical officers of health who do report fully ever fail to obtain re-election. The Notification of Births Act is in force in three districts in the administrative county—namely, Barking, Grays, and Ilford. In each district a woman health visitor has been appointed. Referring to the necessity for making a chemical and bacteriological examination of a water supply, Dr. Thresh expresses the opinion that while a chemical examination is absolutely necessary, a bacteriological examination may or may not be required. At the Essex county public health laboratory it is the custom to make a chemical examination first, and, if the results leave any doubt as to the wholesomeness of the supply, such bacteriological tests are applied as may be necessary to arrive at a definite conclusion.

Medical News.

WE are requested to state that the second fortnight of the post-graduate course now in progress at Edinburgh commences on Monday, September 19th. Each of its several parts is independent. The honorary secretary is Dr. Edwin Bramwell, whose official address is University New Buildings, Edinburgh.

IN consequence of representations made by the General Shipowners' Society, London, the Board of Trade is now reconsidering the scale of medicines prescribed for use on board ship. With a view of assisting the Board of Trade to arrive at a decision on the subject, medical officers of the leading steamship lines have formulated a modern list of drugs.

ON September 12th Mr. Herbert Samuel, Postmaster-General, formally handed over to the Committee of the National Sanatorium at Benenden, Kent, a new twenty-bedded pavilion subscribed for by the Post Office Branch of the National Association for the Establishment and Maintenance of Sanatoria for Workers' Friendly Society.

A TOWN planning and model house exhibition is to be held next summer at the Romford Garden Suburb, and in connexion with it a competition for certain prizes of considerable value is announced. Most of them relate to cottages and houses to cost not more than a fixed price, and examples of which the competitors are to supply. Another is for the best suggested plan of laying out the Gidea Park Estate.

THE tenth International Congress of Pharmacy was held recently at Brussels. Delegates from sixteen different Governments and from most of the prominent pharmaceutical associations of Europe were present. Among the subjects discussed were the general principles on which the official examination of medicinal preparations should be based. It was unanimously resolved to invite the Belgian Government to convene at as early a date as possible an international conference for the purpose of unifying the method of the analysis of potent drugs. It was also resolved to request the editors and the various committees of different pharmacopoeias to adopt in the next edition of these volumes analytical reagents of a uniform character.

Letters, Notes, and Answers.

COMMUNICATIONS respecting Editorial matters should be addressed to the Editor, 429, Strand, London, W.C.; those concerning business matters, advertisements, non-delivery of the JOURNAL, etc., should be addressed to the Office, 429, Strand, London, W.C.

TELEGRAPHIC ADDRESS.—The telegraphic address of the EDITOR of the BRITISH MEDICAL JOURNAL is *Aitiology, London.* The telegraphic address of the BRITISH MEDICAL JOURNAL is *Articulate, London.*

TELEPHONE (National):—
2631, Gerrard, EDITOR, BRITISH MEDICAL JOURNAL.
2630, Gerrard, BRITISH MEDICAL ASSOCIATION.
2634, Gerrard, MEDICAL SECRETARY.

ORIGINAL ARTICLES and LETTERS *forwarded for publication are understood to be offered to the* BRITISH MEDICAL JOURNAL *alone unless the contrary be stated.*

☞ *Queries, answers, and communications relating to subjects to which special departments of the* BRITISH MEDICAL JOURNAL *are devoted will be found under their respective headings.*

QUERIES.

R. C. writes: Can any member inform me of a ladies' club or similar institution suitable for a lady dispenser engaged during the day in a N.W. practice?

GEAR-BOX writes: Before taking a contemplated plunge from petrol motors, I should very much like if some medical users of Stanley steamers would allow me to communicate with them.

RUSTICUS desires to know where to obtain information about the relative values of: (1) the Alexander-Adams operation; (2) the intraperitoneal method of shortening the round ligaments; (3) the fixation method advocated by Kelly in treatment of retroversions and retroflexions of the uterus.

NORTH would be much obliged if some one could advise him as regards a suitable place in the South of England or elsewhere where a medical man, who has been ordered to spend the winter months in a milder and drier climate than that of the North of Ireland, could go to. A really comfortable seaside golf hotel with moderate winter tariff and golf charges would be most suitable, as outdoor exercise is essential.

RUS writes: I am staying in a house in the North of England where there is a plague of what the owner calls mosquitos. Whether they are real mosquitos I do not know, but they are buzzing, biting insects, which possibly were in the empty house, or may have been imported in some foreign furniture. Could you or any reader tell me how to get rid of them?

X. desires to know if any one can suggest a line of treatment for an obstinate case of erythema multiforme occurring in a little girl of 3 years old. The recurrent eruption disappeared for a time under strict sour-milk treatment, but the child grew weary of taking it, and immediately on its being slackened the spots began to reappear. Change of air has been tried, tonics of various kinds, arsenic, salol, etc. An attempt was made to give naphthol β, but the nauseous properties of the drug defied attempts to conceal it. The eruption has now lasted many months.

ANSWERS.

G. A. F.—Application should be made to the Secretary, National Hospital for the Paralysed, etc., Queen Square, Bloomsbury, who would probably be able to recommend a suitable home.

M.B.—Our correspondent must use his own judgement in the matter. In the few cases in which the Fallopian tubes have been removed on account of tubal pregnancy or some other morbid change, we are not aware that any ill results hav followed.

INDIAN DIPLOMAS.

L.R.C.P. AND S.—The only diplomas granted in India which entitle their holder to be registered, and therefore to practise, in this country are those of the Universities of Calcutta, Bombay, Madras, and Punjab respectively. As for the Colonies, each of them is its own master in respect of granting or refusing admission to its register, but when dealing with foreign diplomas—that is, those not locally obtained—the smaller Colonies commonly adopt the practice of this country.

TROUBLESOME ERECTION.

ANT-APHRODISIAC writes: In answer to "A Correspondent" in the JOURNAL of September 3rd, I may state as a personal experience, after taking a nightly dose of 3ss pot. brom. for nearly two years, on account of a slight attack of *petit ma*

that this had a strongly sedative effect on the sexual function, erections and desire being almost absent. I have used the same treatment in a patient who was troubled in the same way as "Correspondent's" with good result. It might be worth while to try it, at least for a time. If flavoured with saccharin it is quite a pleasant "nightcap."

LOCAL ANAESTHETIC IN OPERATION FOR HYDROCELE.

PHARMAKOS writes: In your issue of September 10th, 1910, p. 731, you publish a formula for a local anaesthetic received from Dr. Hutchinson of Glasgow. Permit me to point out (1) that adrenalin hydrochloride is a solid and cannot be measured in minims—possibly your correspondent means liq. adren. hydrochlor. 1 in 1,000, but he does not say so; (2) that he has not indicated the maker of the distilled water, while giving a source for the other ingredients; and (3) that a solution of cocaine and adrenalin does *not* keep well without added antiseptic unless sterilized and kept in ampoules.

LETTERS, NOTES, ETC.

TREATMENT OF INFLAMED ARM AFTER VACCINATION.

DEPUTY INSPECTOR-GENERAL J. J. DENNIS, R.N., M.D., writes: One perhaps sees, and frequently hears, of bad arms after vaccination against small-pox. The treatment in many cases has been fomentation. I should like to point out the magic effect of the local application over the inflamed parts of equal parts of liq. ferri perchlor. and glycerine, with a dry dressing over all. The time on the sick list will be found to be much shortened.

FRACTURE OF THE PENIS.

C. H. P. writes: In the EPITOME of August 27th there is a case quoted of "fracture of penis." The enclosed extract from an old book of anatomy (*Samuel Collins' Anatomy*, London, 1685, Vol. I, Book I., Part IV, page 535, para. 4) is interesting as illustrating a similar injury: "A gentleman, who being influenced with amorous Desires, courted his mistress in order to fruition and paid dear for his sport, as having his unchast flame quenched before it was raised to a hight, by reason his unkind mistress gave a speedy check to his Amours in putting by his Thrust, by taking his drawn weapon into her hand, whereby the Weapon and not her Hand was wounded; so that the arteries of the nervous bodies relating to the yard, highly distended with a great source of blood and violently crushed with a rough hand, were thereby lacerated and a great effusion of blood passed through the urethra, whereupon the yard grew immediately lank upon a free discharge of blood out of the arteries furnishing the nervous bodies."

THE CAUSATION OF SEX.

DR. OLIVER BEDDARD (London, E.C.) writes: Dr. Martindale Ward's letter (August 27th) suggests to me a saying common among the old women in Norfolk, "Any one can have a boy, but it takes a man to get a girl."

DR. LOUIS E. STEVENSON (Temple Sowerby, Westmorland) writes: I think the simplest solution of this difficult question is to suppose that the sex of the child depends on the relative strength of the male and female elements at the time of conception—that if the spermatozoon be the more vigorous a female will result and vice versa. The following sexual family history is, to my mind, very instructive. I know a family where the husband is physically very much stronger than the wife. Their first three children were all daughters. The husband then suffered a year's very bad health following on a severe attack of influenza. Towards the end of this year a son was born. When the husband's health was restored two more daughters were born. The husband then suffered from great prostration and shock for about two years, the result of a severe cab accident in London. During this period (in the second year) another boy was born. The youngest child is a daughter who was born after the recovery of the husband. On this theory a hermaphrodite would be the result of conception when the strength of the sexual elements was exactly equal—naturally a rare occurrence. Twins of both sexes would be the result of the fertilization of ova of different relative strengths.

ST. PAUL'S "THORN IN THE FLESH."

DR. W. J. YOUNG (Cambridge) writes: Permit me a few words in reply to "J. B.'s" statement, "Christ and the Apostles spoke in Aramaic." Surely "J. B." cannot be familiar with the evidence. True, Farrar in his *Life of Christ* concludes that Christ did not speak Greek; but, as has been pointed out, Farrar's dramatic sense was keener and truer than his logical faculty, for he speaks of the Lord's "final emphatic word τετέλεσται"! "J. B." should read Roberts's *Discussions on the Gospels* and Conybeare's *Greek Used by Christ*. These would, I think, lead him to modify his sweeping statement. The facts are: (1) Christ spoke *generally* in Greek, occasionally in Aramaic. (2) The names of at least one Apostle (Philip) and all the seven deacons are Greek. (3) Greek was *the* universal language of the time from Britain to India. It was so much the common language that Romans complained of the neglect of Latin *in home life*, and Caesar's last words were not "et tu, Brute," but καὶ σύ, παιδίον. It would, therefore, have been impossible for Luke, a physician of Antioch (see Lightfoot, *Supernatural Religion*), to have been ignorant of that language, or to have written to Theophilus (a Greek name, by the way) in Aramaic. (4) Paul spoke Greek to Lysias in Jerusalem (Acts xxi, 37), and Luke records it as a *special circumstance* that Paul addressed the mob in Aramaic. Paul, also, speaking Greek before Festus and Agrippa, alludes to the *special* event of Christ addressing him in Aramaic (Acts xxvi, 14). (5) Peter and James both quote the LXX where it differs from the Hebrew, in the latter case (Acts xv, 15–18) where the difference is the point of the quotation. Study of the New Testament itself should help "J. B." to think again. In the meantime he might do worse than answer to his own satisfaction the following questions: What language did Christ speak to the Greek woman (Mark vii, 26)? What language spoke the Greeks who came to Jerusalem, and why did they approach *Philip*, and what language did they expect Jesus to speak to them (John xii, 20–22)? What language was Jesus speaking when he said "Abba, Father" (Mark xiv, 36)? How is the word ἐπιούσιον to be accounted for in the Lord's Prayer? This is the first time in a long experience that I have ever known it suggested that Luke wrote in Aramaic. I would recommend "J. B." to get and study Green's *Handbook to Greek Grammar of the New Testament*. As to the "thorn" itself, I agree with those of your correspondents who regard it as probably an affection of the eyes, but the evidence, though pointing that way, is not absolutely conclusive. That it was a superhuman Satanic presence haunting him, like Luther's devil, is a theory which cannot commend itself to us in these days, nor, indeed, to any one who is familiar with the Scripture.

DR. G. A. FERRABY (Nottingham) writes: In the JOURNAL of September 10th, p. 732, it is suggested that the Acts of the Apostles is a translation from an Aramaic original. I am no textual critic, but surely this is an error, since St. Paul, the chief actor in the later events, and St. Luke, who recorded them, were both Greek-speaking Jews (if the latter was a Jew). The only part of St. Luke's writings which I have seen it suggested as not being of his own composition consists of the first two chapters of his gospel, which, it is thought by some, may have been a transcript (or translation?) of a record possibly written by our Lord's Mother. As to a previous suggestion by another writer that St. Paul's trouble was due to chronic glaucoma, I think two considerations dispose of the suggestion. First, it does not fit in with the indication in Gal. iv, 14, that it was a loathsome condition; and, secondly, this epistle was probably written (according to Angus's *Bible Handbook*) A.D. 57 or 58, while it gives his visit to Galatia as in A.D. 51. I doubt if a man in those days with obvious symptoms of chronic glaucoma would see to write, even in large characters, some six or seven years later. I have no positive suggestion to make on the general question, but wish to help towards a diagnosis by exclusion.

DR. GEORGE JONES (Blackheath) writes: I am sorry not to be able to give more time to the discussion on St. Paul's trouble. If your two last correspondents are satisfied that St. Paul had (1) as Dr. Welch seems to suggest, a headache lasting for many years *off and on* but somewhat similar in causation to Jacksonian epilepsy well and good, only the matter begins to suggest to a lawyer things he has heard in court when cross-examining an applicant under the Workmen's Compensation Act. (2) Dr. Poynder's author suggests a *stimulus carnis* of the kind reprobated by Luther (*vide* Lightfoot *ad loc.*), well and good. I have no more to say to them; but I do wish once more to urge upon the court consisting of your readers, without quoting further details: (*a*) That St. Paul does not say that he was troubled with either sensual or neurotic suggestions or "nervous debility," nor does he ever doubt his powers. Nor do his letters ever suggest anything but physical fatigue (for example, the shipwreck); (*b*) that he did not write his letters himself but dictated them, taking up the pen only to add the last lines in a large hand similar to that used by some myopes; (*c*) that when we find physical explanations of phenomena it is no part of our duty to search for metaphysical explanations thereof.

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